BENEFIT SHARING AND ENVIRONMENTAL SUSTAINABILITY IN POLICY AND PRACTICE: THE COMMERCIALISATION OF THE RESURRECTION BUSH (*Myrothamnus flabellifolius*) IN SOUTHERN AFRICA

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Title page photograph: Women resurrection bush harvesters from Chivi district, Zimbabwe. Phototgraph: Michelle Nott, 10 May, Chivi district, Zimbabwe.

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ABSTRACT

The trade of non-timber forest products (NTFPs), also known as biotrade, has existed for hundreds of years – as has the traditional knowledge associated with such products. More recently, this form of trade has advanced to include genetic resource components found within natural resources (bioprospecting). International agreements such as the Convention on Biological Diversity (CBD) and Nagoya Protocol came into force in 1993 and 2010 respectively, to ensure that biological diversity is conserved, sustainably utilised, and that the benefits arising from the utilisation of genetic resources and/or associated traditional knowledge are shared in an equitable manner. In practice, however, there is a lack of evidence to suggest whether the provisions of the CBD and Nagoya Protocol are being adequately implemented and achieved. This research focuses on the commercialisation of the resurrection bush (*Myrothamnus flabellifolius*) in Zimbabwe, Namibia and South Africa and critically evaluates how the requirements of the CBD and Nagoya Protocol are applied. The resurrection bush spans a number of countries and has been used traditionally by a variety of ethnic communities residing in Africa. Traditional medicinal uses for the resurrection bush include using the plant to treat colds and flu, scurvy, coughs, abdominal pain, epilepsy, and asthma. This study aims to uncover and understand the way in which benefit sharing and environmental sustainability are interpreted and implemented in various resurrection bush commercialisation approaches.

Six objectives are articulated to achieve this aim: (1) to review the historical use and traditional knowledge associated with the resurrection bush; (2) to describe the different ways the resurrection bush is commercialised and the different processes each commercialisation strategy follows; (3) to describe the actors involved in the different resurrection bush commercialisation strategies and their roles in the commercialisation process; (4) to explore, within each commercialisation strategy, how commercial actors gain access to resources; (5) to describe and analyse the range of benefits derived from each commercialisation approach; and (6) to assess the policy implications and practical applications of current resurrection bush commercialisation approaches.

This research adopted a qualitative case study methodological approach, in which 26 key informant interviews and 137 semi-structured harvester interviews were conducted in

Namibia, Zimbabwe and South Africa. The key informants consisted of private companies, NGOs, and government officials across all three countries. Interviews with these informants were carried out to determine the diversity of commercialisation approaches associated with the resurrection bush, the actors involved, the ways in which commercial entities gain access to resources, how benefits are shared, and what measures are put in place for environmental sustainability. Further interviews were conducted with resurrection bush collectors in Namibia and Zimbabwe to review the historical and traditional uses associated with the resurrection bush. Understanding these uses provides insight into the types of agreements developed for its commercialisation and associated environmental, social and economic benefits.

It was found that there are three commercialisation approaches associated with the resurrection bush across Namibia, Zimbabwe and South Africa. They are: (1) Informal trade, where harvesters sell raw material directly to consumers based on informal, verbal agreements; (2) Biotrade, where the value chain is longer and consists of more formal agreements; and (3) Bioprospecting, where research and development of the resurrection bush is a strong component, involving negotiations with harvesters and formal written agreements. Several key findings emerged to inform current and future commercialisation approaches. The inadequate implementation of regulatory frameworks within each commercialisation approach has negatively impacted harvesters and overall economic growth. Harvesters are not receiving maximum benefits from commercialisation due to elite capture of benefits from resurrection bush cultivation sites and significant profit margins on end products. Traditional knowledge holders are not adequately compensated and acknowledged for their innovations and practices due to the absence of sufficient historical records of traditional knowledge, and cooperation between countries and communities who share resources which are commonly used. Long-term conservation efforts associated with the resurrection bush are lacking in all commercialisation approaches due the belief that because there is an abundance of the resource in the wild, additional conservation measures are not needed.

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ABS – Access and Benefit Sharing

AIDS – Acquired Immune Deficiency Syndrome

BABS – Bioprospecting, Access and Benefit Sharing

BIZ – Bio-Innovation Zimbabwe

BSA – Benefit Sharing Agreement

CAMPFIRE – Communal Areas Programme for Indigenous Resource Management

CBD – Convention on Biological Diversity

CBNRM – Community Based Natural Resource Management

CEO – Chief Executive Officer

CITIES – Convention on International Trade in Endangered Species of Wild Fauna and Flora

CSIR – Council for Scientific and Industrial Research

DA – District Administrator

DART – Directorate of Agricultural Research and Training

DEA – Department of Environmental Affairs

EMA – Environmental Management Agency

GDP – Gross Domestic Product

HIV – Human Immunodeficiency Virus

IBPC – Interim Bio-Prospecting Committee

IRDNC – Integrated Rural Development and Nature Conservation

ITCZ – Indigenous Tea Company Zimbabwe

KAZA – Kavango – Zambezi

KCINP – Kunene Conservancies Indigenous Natural Products

KZN – Kwa-Zulu Natal

MAT – Mutually Agreed Terms

MAWF – Ministry of Agriculture, Water and Forestry

MEC – Member of the Executive Council

MCC – Millennium Challenge Corporation

MET – Ministry of Environment and Tourism

MoE – Ministry of Environment

MoU – Memorandum of Understanding

MTA – Material Transfer Agreement

N/A – Not applicable

NEMBA – National Environmental Management: Biodiversity Act

NBA – National Biotechnology Authority

NBRI – National Botanical Research Institute

NCRST – National Commission on Research, Science and Technology

NKSC – National Khoi and San Council

NGO – Non-governmental organisation

NTFP – Non-Timber Forest Product

OPF – Opuwo Processing Facility

PEN – Poverty Environment Network

PIC – Prior Informed Consent

PPO – Producer and Processor Organisation

RDC – Rural District Council

SANBio – Southern Africa Network for Biosciences

TB – Tuberculosis

ToPS – Threatened or Protected Species

UEBT – Union for Ethical BioTrade

UCT – University of Cape Town

UK – United Kingdom

WSSD – World Summit on Sustainable Development

CHAPTER ONE – INTRODUCTION

1. Introduction

1.1 Commercialising natural resources

Across the globe, the trade or barter of non-timber forest products, also known as biotrade, has existed for hundreds of years (Wekundah, 2012). More recently, this form of trade has been further advanced to identify genetic resource components within natural resources and information on associated traditional knowledge (bioprospecting) for commercial use in biotechnology, cosmetic, pharmaceutical and other industries (Drews et al., 2008). As environmental consciousness continues to grow, particularly in sectors such as cosmetics, increasingly informed consumers are now demanding biodiversity-based products that are safe, sustainable and ethically managed (UEBT, 2009a). The Convention on Biological Diversity (CBD) is an international agreement that came into force in 1993 in response to the exploitation, utilisation, and monopolisation of genetic resources and associated traditional knowledge in most parts of the world (Greiber et al., 2012). Genetic resources and traditional knowledge were being used by developed countries without approval from and compensation for resource holders. The three main objectives of the CBD are: the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of benefits arising from the use of the utilisation of genetic resources (Kamau et al., 2010). To further advance the third objective of the CBD, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization was adopted in 2010. The Nagoya Protocol is the latest international environmental agreement that provides a solid legal platform for consolidating and developing modern biodiversity-based business (CBD, 2015).

It is important to note that both the CBD and the Nagoya Protocol focus on the utilisation of genetic resources and/or associated traditional knowledge and therefore exclude biotrade from the scope of Access and Benefit Sharing (ABS). Traditional knowledge has often been developed by indigenous and local communities as a response to the intellectual necessities of life (WIPO, 2005). Such knowledge has been used to provide vital information for identifying the different uses of genetic resources for commercialisation (CBD, 2010b). Consequently, both the CBD and Nagoya Protocol provide a platform to encourage the

equitable sharing of benefits derived from the utilisation of traditional knowledge, innovations, and practices. So-called ABS is centred around justice, where biologically rich countries of the developing world are intended to reap benefits from the use of natural resources and local knowledge from technologically rich, developed countries (Aubertin and Filoche, 2011; van Niekerk and Wynberg, 2012). One rationale for this is to provide an incentive for provider countries to sustainably utilise and conserve natural resources (CBD, 2011a). Since the inception of the CBD, however, the challenge of improving primary producer benefits from the successful marketing of biodiversity-based products still prevails (Drews et al., 2008). In addition, confusion reigns as to the regulation of natural resources (biotrade) and genetic resources (bioprospecting) and when ABS requirements are applicable (Wynberg et al., 2015; Wynberg, 2016).

1.2 Commercial potential of *Myrothamnus flabellifolius*

Myrothamnus flabellifolius, a non-timber forest product (NTFP) more commonly known as the "resurrection bush", is an angiosperm related to the genus *Gunnera.* The name *Myrothamnus flabellifolius* is derived from the Latin terms *myron* (which means "aromatic"), *thamnos* (meaning "bush"), and *flabellifolius* (meaning "fan-like leaves") (Moore et al., 2007a). The resurrection bush has the ability to dehydrate its vegetative tissue, suffer more than 95% water loss, and exist for months or years in an air-dried, dormant state (Moore et al., 2007a; IRDNC, 2016). When water is provided to the roots of the resurrection bush, the plant rehydrates its desiccated tissue and resumes its original state within a few hours (Moore et al., 2007a). Through research and development, it was found that a mixture of essential oils can be extracted from the resurrection bush which can be used for medicinal and/or cosmetic purposes (IRDNC, 2016). Because the resurrection bush has the ability to preserve its cells during very dry periods, an extract of the species has been commercially sold as a protective agent against aging of the human skin (IRDNC, 2016).

Aside from its commercial potential, the resurrection bush is used traditionally by many ethnic communities residing in Africa (van Vuuren, 2007). It is one of the many plant species that is used to treat more than one disease (Setshogo and Mbereki, 2011). According to van Wyk et al. (1997), some uses include infusions drunk for colds and respiratory ailments, and decoctions taken to alleviate backache, kidney problems, haemorrhoids, and painful

menstruation. A lotion of the leaves has been used externally to treat abrasions and dried powdered leaves can be used to dress burns and wounds (van Wyk et al., 1997). Because the resurrection bush is abundant across southern Africa, three countries were identified as the focus of this research – Namibia, Zimbabwe, and South Africa.

1.3 Implementation of the Nagoya Protocol in Namibia, Zimbabwe, and South Africa

Two-thirds of Namibia's population – approximately 1 734 779 million people – live in rural areas and largely depend on natural resources and agriculture to sustain their livelihoods (Corbett and Jones, 2000; Schiffer, 2004; Jones and Weaver, 2009). As a state-owned asset from which they could receive no benefits, wildlife came to be seen by local communities with hostility (Brown and Bird, 2011). The resulting exploitation of ivory, rhino horn and hide and local hunting for food or trade meant that poaching levels were high. In 1992, the Ministry of Wildlife, Conservation and Tourism (now known as the Ministry of Environment and Tourism) developed the first draft of a policy which provided rights over wildlife and tourism for communities that formed a common property resource management institution called a "conservancy" (Suich, 2010). This programme was later extended to include the commercialisation of indigenous plant products. In 2001, the government approved the Forest Act 12, which allows local communities to obtain rights over forest management (Brown and Bird, 2011). The intention of the Act was to promote wildlife conservation and to enhance the management of high value forestry products (IRDNC, 2011). Namibia released their national ABS legislation in 2017 with the *Access to Biological and Genetic Resources and Associated Traditional Knowledge Act No. 2 of 2017*. The legislation covers both biological and genetic resources, but the regulations highlight that commodity trade or biotrade is excluded from the scope of the national regulations.

Like in Namibia, two-thirds of Zimbabwe's population of 11 343 203 million people depend on agricultural practices for the majority of their annual income (Grundy and Le Breton, 1997; Global Water Partnership, 2011). Population growth is a significant challenge in rural areas, playing a significant role in the perpetuation of poverty and degradation of land (Child, 1996). As a result, a heavy dependence on the already declining natural resource base has escalated (Grundy and Le Breton, 1997). Wildlife populations have decreased at a rapid rate and much of the land has been converted for agricultural use (Frost and Bond, 2008). In response to this, the Communal Areas Programme for Indigenous Resource Management

(CAMPFIRE) was initiated in the late 1980s to decentralise the management of natural resources, particularly wildlife, to local communities (Child, 1996; Grundy and Le Breton, 1997). Because the CAMPFIRE programme was primarily focused on wildlife resources, a local NGO works with local communities to drive research and to assist with knowledge sharing and the commercialisation of underutilised indigenous plants in Zimbabwe (BIZ, 2013). *Statutory Instrument 61 of 2009*, the Environmental Management (Access to Genetic Resources and Indigenous Genetic Resource-based Knowledge) Regulation, is the pillar of ABS in Zimbabwe. The regulations define community rights and emphasises the procedures involved with obtaining Prior Informed Consent (PIC) to ensure the fair and equitable distribution of benefits arising from the utilisation of genetic resources and indigenous genetic resource-based knowledge (Shumba et al., 2009; Chibememe et al., 2014). This instrument regulates genetic resources only, as stipulated by the Nagoya Protocol.

In South Africa, Chapter 6 of the *National Environmental Management: Biodiversity Act, 10 of 2004* (NEMBA) came into force in 2006 to establish rules for ABS in South Africa (RSA, 2004). In 2008, the Bioprospecting, Access and Benefit Sharing (BABS) regulations were released. In 2015, amendments to BABS were made to include biological resources, specifying the necessary requirements to obtain a biotrade permit (RSA, 2015). Therefore, under this Act, biological and genetic resources are regulated in the same way. This has had negative repercussions for the country, especially for harvester communities, traditional knowledge holders, and industries (Wynberg et al., 2015).

1.4 Rationale

The resurrection bush has major commercial potential, predominantly in the cosmetics industry, and could generate significant benefits for the most marginalised sectors of society. ABS provides a platform to commercialise genetic resources which, in theory, could yield environmental and livelihood benefits (CBD, 2011a). The literature on ABS suggests how ABS should be implemented and what benefits should arise from the utilisation of genetic resources but there is very little practical evidence to support this (CBD, 2002; CBD, 2010a; CBD, 2010b; CBD, 2011a; CBD, 2011b). Therefore, this study will compare the way in which the different resurrection bush commercialisation approaches are implemented in policy and practice to determine how biological and genetic resources are accessed, how the

benefits of their use are shared, and how this supports the sustainable use and conservation of the resurrection bush for commercialisation.

Wynberg (2016) highlights that, in practice, there is uncertainty around the distinction between biological and genetic resources, especially for species that can be used in different ways by different sectors. This raises questions of when ABS requirements apply, when the utilisation of resources falls under the definition of biotrade, and what implications these different approaches have in terms of benefit sharing. The resurrection bush is a fitting case study to explore these issues as it is a species that is used by a variety of industries for different commercial outputs. This study therefore draws on comparisons between biotrade and bioprospecting commercialisation approaches to determine the range of benefits that can be secured for local communities and conservation.

1.5 Research aim and objectives

The overall aim of the study is to uncover and understand the ways in which benefit sharing and environmental sustainability is interpreted and implemented in the different approaches to the commercialization of the resurrection bush. Determining the suite of benefits each approach yields for local livelihoods and biodiversity conservation will serve to inform current and future commercialisation approaches. To achieve this aim, the following six objectives were set:

1. To review the historical use and traditional knowledge associated with *M. flabellifolius*
2. To describe the different ways *M. flabellifolius* is commercialised and the different processes each commercialisation strategy follows
3. To describe the actors involved in the different *M. flabellifolius* commercialisation strategies and their roles in the commercialisation process
4. To explore, within each commercialisation strategy, how commercial actors gain access to resources
5. To describe and analyse the range of benefits derived from each commercialisation approach
6. To assess the policy implications and practical applications of current approaches to the commercialisation of *M. flabellifolius.*

1.6 Summary of study sites and methodology

This research was conducted in four conservancies in Namibia (Orupembe, Sanitatas, Otjiu-West, and Otjitanda) and one district in Zimbabwe (Chivi district). In South Africa sites were targeted where there were activities relating to the commercialisation and trade of the resurrection bush such as a resurrection bush cultivation nursery in Gauteng and an informal market in northern Kwa-Zulu Natal (KZN). However, permission was not granted to visit the main resurrection bush cultivation site in Gauteng and due to safety concerns, the informal market in KZN was not visited. A qualitative case study methodology was adopted whereby a variety of data collection methods, such as semi-structured interviews, key informant interviews, and participant observation, were used. In total, 26 key informant interviews were conducted in Namibia, Zimbabwe and South Africa and 137 semi-structured harvester interviews were completed in Namibia and Zimbabwe. The key informants consisted of private companies, non-governmental organisations (NGOs), and government officials across all three countries. The interviews were carried out to determine the diversity of commercialisation approaches associated with the resurrection bush, the actors involved, the ways in which commercial entities gain access to resources, how benefits are shared, and what measures are put in place for environmental sustainability. Harvester interviews were conducted with resurrection bush collectors in Namibia and Zimbabwe to review the historical and traditional uses associated with the resurrection bush.

1.7 Thesis structure

This thesis has 10 chapters which are set out as follows:

Chapter 1 provides an introduction to the study, rationale for the research, the overall aim and objectives of the study, and a summary of the methodology used.

Chapter 2 reviews existing literature pertaining to non-timber forest products (NTFPs), commercialising NTFPs, NTFP value chains and the environmental concerns associated with NTFP commercialisation. The Convention on Biological Diversity (CBD), the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits

Arising from their Utilisation, bioprospecting and biotrade, and *Myrothamnus flabellifolius* (the resurrection bush) are also examined.

Chapter 3 describes the research approach adopted for this study and the methods used to collect the qualitative data. This chapter also gives a description of the study sites and how the data obtained was analysed. The ethical considerations pertaining to this research are also explained in this chapter.

Chapter 4 provides a background and context to each of the study sites, including the policy and regulatory requirements associated with the commercialisation of natural resources in each country.

Chapter 5 describes the traditional knowledge associated with the resurrection bush and the harvesters' use of the species across the different study sites.

Chapter 6 outlines the actors involved in each of the commercialisation activities and their role in the commercialisation process

Chapter 7 describes each of the different commercialisation activities associated with the resurrection bush and the range of products derived from each of the approaches.

Chapter 8 provides an overview of the regulatory requirements that govern resource commercialisation at each of the study sites, including the processes involved with harvesting the resurrection bush, accessing genetic resources, and the monetary and non-monetary benefits received from commercialising the species.

Chapter 9 discusses the three commercialisation approaches associated with the resurrection bush and the differences and/or similarities between them.

Chapter 10 presents the conclusions of this study and provides recommendations for best-practice policy making and implementation for current and future commercialisation approaches.

2. Chapter 2 – Literature review

2.1 Defining NTFPs

Globally, non-timber forest products, also known as NTFPs, have been harvested for thousands of years from a diversity of environments (Ticktin, 2004; Ticktin, 2015). Particularly in developing countries, rural households make use of goods freely provided by the environment to meet their livelihood needs (Angelson et al., 2014). Over the past three decades, the importance of NTFPs and their contribution to livelihoods has been increasingly appreciated and acknowledged by scholars (Shackleton et al., 2011). The term NTFP was first devised by de Beer and McDermott (1989) who defined them as "all biological materials other than commercial timber which are extracted from forests for human use" (Belcher, 2003: 161). This definition raised considerable debate as the idea of "forest" was seen as too restrictive and not inclusive of other landscapes (Belcher, 2003). Authors then defined NTFPs to suit their own interests and objectives, but the variations on what should be included or excluded left enormous room for ambiguity (Belcher, 2003). Later, the definition was slightly altered to be less restrictive and more inclusive of different landscapes and ecosystems (grasslands, wetlands, savannas, etc.) and was then defined as "all biological materials extracted from any landscape for human use, excluding commercial timber" (Shackleton, 2015: 13). Examples of NTFPs include: wild foods (fruits and vegetables), fuelwood, fodder, resins, bark, construction materials, medicine, and other products found in natural, uncultivated environments (Angelson et al., 2014; Shackleton, 2015). The core idea surrounding the concept of NTFPs is that they are renewable resources that can be utilised in such a way to enhance rural livelihoods economically, socially and physically, while simultaneously fostering environmental conservation (Belcher, 2003).

2.2 Importance of NTFPs to rural livelihoods and economies

Populations living near natural resources have a long history of NTFP extraction for both subsistence use and/or sale (Ticktin, 2004; Delang, 2006). Today, millions of households across the globe make use of a number of biological products from the wild to meet their income needs, to provide food security, and to ensure a balanced nutritional diet (Shackleton and Shackleton, 2004; Shackleton et al., 2007; Ndangalasi et al., 2007; Galloway, 2014). Rural households are particularly vulnerable to misfortune as they are prone to uncertainties such as changes in weather and climate, illness or disease, crime, and changes in commodity

prices or government policies (Wunder et al., 2014). Poverty is greatest in rural areas, particularly among female-headed households. NTFPs can therefore play a vital role in poverty alleviation, or at the very least, poverty mitigation (Shackleton et al., 2007). In many households, NTFPs are not the only source of livelihood income but contribute as an additional source among others such as agriculture, livestock rearing, grants, remittances and pensions (Shackleton et al., 2007; Galloway, 2014). If these alternative livelihood strategies are absent due to economic and social constraints, NTFPs may be the only source of livelihood income for households (Shackleton and Shackleton, 2004; Shackleton et al., 2008; Steele et al., 2015).

Angelson et al. (2014) and Steele et al. (2015) identify three primary roles of environmental income in supporting rural livelihoods. These include: supporting current consumption (daily net), providing safety nets in response to shocks or stresses, and providing a means to acquire cash income (trade). The "daily net" refers to the daily harvesting and use of NTFPs for subsistence purposes (food, medicines, shelter, energy), forming an integral part of direct household provisioning (Shackleton and Shackleton, 2004; Shackleton, 2015). A study done in Bangladesh found that of 216 households, only one third sold NTFPs for cash income; the remaining households used NTFPs for subsistence (Kar and Jacobson, 2012). Many NTFPs are also strongly embedded in the cultures of the communities who harvest them (Shackleton, 2015). They play an important role in certain rituals and ceremonies and their use may have local symbolism as well as aesthetic value (Shackleton, 2015). A study done in a rural Eastern Cape village in South Africa found that almost three quarters of the households interviewed used wild plant species for cultural rituals (Cocks and Wiersum, 2003). The sale of cultural artefacts derived from NTFPs may also serve as an income-generating opportunity (Shackleton, 2015). The daily net function provides an additional direct benefit to rural households in the form of cost savings, as households can invest the money they would have spent on buying food, medicines, fuel, or construction materials in other expenses such as school fees or agriculture (Shackleton and Shackleton, 2004).

The safety-net function, also known as an "emergency net", refers to the use of NTFPs during times of hardship or adversity (Shackleton and Shackleton, 2004; Shackleton et al., 2007; Shackleton et al., 2011; Shackleton, 2015). Forest resources are commonly identified as a safety-net source where household labour is directed primarily towards resource extraction (Wunder et al., 2014). NTFPs therefore act as a coping strategy in times of drought or flood,

where there has been a loss of crops or livestock, where the breadwinner has died or been retrenched, or where there have been unexpected increases in expenses (Shackleton and Shackleton 2004; Galloway, 2014; Shackleton, 2015). Rural households tend to rely on NTFPs during these times to tide them over unforeseen shocks or stresses (Shackleton and Shackleton, 2004). This dependence on NTFPs may manifest in three forms: (1) the increased harvesting of NTFPs that were not previously collected for household use; (2) the increased use of NTFPs that are already part of livelihood activities, and (3) the temporary sale of NTFPs on local and regional markets (Shackleton and Shackleton, 2004). Thus, it can be understood that NTFPs are used to prevent rural households from falling deeper into poverty.

A study done among the Tawahka community in Honduras found that following the hurricane that struck in 1998 which destroyed almost all agricultural crops and a number of households, individuals immediately turned to NTFPs to cope with and recover from the shock (McSweeney, 2005). Construction materials were sourced to rebuild houses, and bush meat and brushes were sold to make a living for the duration of the unexpected disaster (McSweeney, 2005). A study done in two conservancies in Namibia found that the harvesting of *Commiphora* resin coincides with the dry season where poor grazing and drought render the community particularly vulnerable (Galloway, 2014). The sale of *Commiphora* during this time allowed individuals to make extra income without having to rely on drought relief assistance schemes (Galloway et al., 2016). The safety-net and daily net functions are therefore not only a benefit or savings to rural livelihoods but also to the government who would have to provide these services to the rural poor in the absence of NTFPs (Shackleton and Shackleton, 2004). The government can then invest this money into education and infrastructure to enhance rural development and the livelihoods of the rural poor (Shackleton, 2015).

2.3 NTFP commercialisation - an engine for rural growth?

The commercialisation of NTFPs is understood as increasing the value of an NTFP through trade (Belcher and Schreckenberg, 2007). More recently, this activity has become known as "biotrade", referring to "biological resources or NTFPs that are traded locally or internationally as bulk, raw materials" (Wynberg et al., 2015). According to the United Nations Conference on Trade and Development, "BioTrade activities include the collection/production, transformation and commercialisation of goods and services derived

from native biodiversity (species and ecosystems) under the criteria of environmental, social and economic sustainability" (UNCTAD, 2007: 1; UNCTAD, 2011: 7). While the term "biotrade" is a fairly new concept, the practice is not.

The commercialisation of NTFPs commonly manifests in the form of direct cash payments or, in more irregular cases, through barter transactions (Dovie, 2003). From a livelihoods perspective, NTFP commercialisation is expected to increase income and employment opportunities for the most marginalised sectors of society (Marshall and Newton, 2003; Shackleton and Shackleton, 2004; Belcher and Schreckenberg, 2007). According to Phounvisouk et al. (2013), the estimated total value of world trade NTFPs is approximately US$ 11 billion per year. One of the aims of NTFP trade is to link poverty alleviation to natural product commercialisation to provide a secure or steady source of income to the rural poor (Shackleton et al., 2008; Galloway, 2014).

A study conducted in two villages (Mpozolo and Ntubeni) in the Eastern Cape, one of the poorest regions in South Africa, found that reed-based crafters ranked crafting as their second most important source of income with income from pension being their first (Pereira et al., 2006). It was found that crafting contributed 26% of annual household cash income, indicating that such trade is highly valued among crafter households in the two villages (Pereira et al., 2006). Results derived from the Poverty Environment Network (PEN), a large quantitative research project on forests and rural livelihoods, found that globally, relative income from crop production was the highest (29%), followed by environmental income (21%) and wages (15%) (Angelson et al., 2014). According to Sjaastad et al. (2005: 40), environmental income is defined as "income earned from wild or uncultivated natural resources". Similarly, Babulo et al. (2009) found that among 360 households in Ethiopia, income from crop production was the largest contributor of total household income, followed by NTFPs at 27%. According to Shackleton et al. (2008), natural resource commercialisation should not be deemed unsuccessful because incomes are not substantially high. Each household engages in NTFP commercialisation for different reasons, with each product serving its own role that differs from one household to another. It is through the integration of multiple livelihood strategies (e.g. arable production, livestock rearing, pension and NTFPs) that there will be a lasting improvement on the welfare of the rural poor, and trade in NTFPs is a significant contributor to such livelihood improvements (Shackleton et al., 2008).

In order to understand the extent to which NTFP commercialisation contributes to livelihood income, it is important to determine what and who is involved in the value chain (Belcher and Schreckenberg, 2007). According to te Velde et al. (2006: 726), "a value chain describes the full range of activities required to bring a product or service from conception to final consumers". Thus, a value chain consists of a number of different actors who specialise in different functions (te Velde et al., 2006). According to Figure 1, a value chain can be broken down into a number of sub-set activities (Belcher and Schreckenberg, 2007). Local value chains are usually short and simple where harvesters sell their products directly to consumers, whereas value chains that extend beyond local boundaries are more complex (Belcher and Schreckenberg, 2007). NTFPs differ quite significantly and therefore the harvesting methods, technology, skills required for processing, and the strength of the demand will determine the number of actors involved in the value chain (te Velde et al., 2006). International trade may require multiple storage, processing, and transport activities by an array of agents and distributors before the highly processed product reaches final consumers (Belcher and Schreckenberg, 2007). Whereas local trade involves informal agreements between actors in the value chain, this type of trade requires formalised contracts or memoranda of understanding (Belcher and Schreckenberg, 2007).

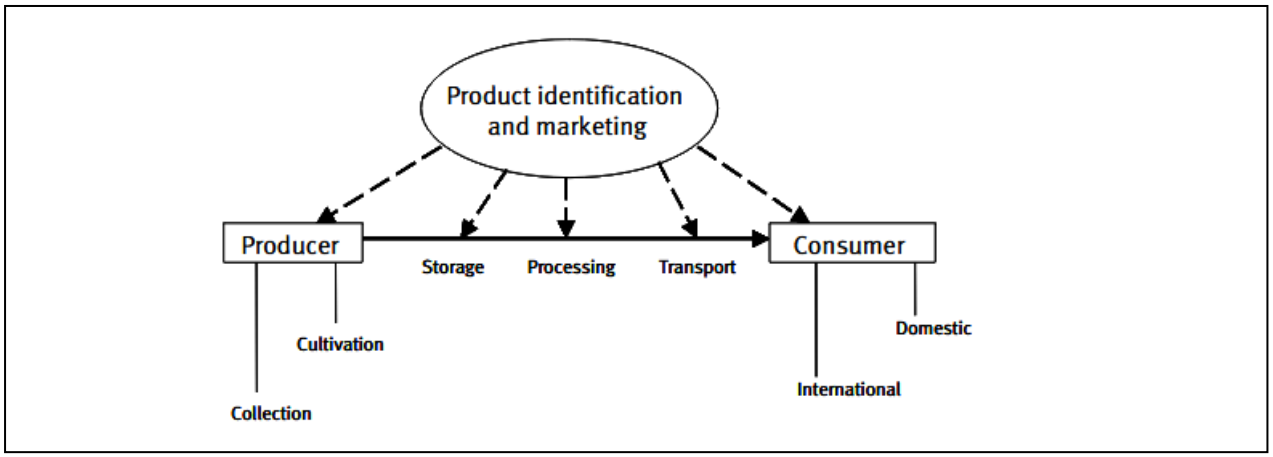


Figure 1: NTFP value chain (Belcher and Schreckenberg, 2007).

In the value chain, entrepreneurs are key to ensuring the successful commercialisation of NTFPs. Without them there would be no contracts in place to facilitate local or international trade and there would be no niche market to sell NTFPs (te Velde et al., 2006). te Velde et al. (2006) for example, found that the commercialisation of Matsutake mushrooms in Mexico was only successful because of a Korean entrepreneur who had alliances with two Japanese

firms. The mushrooms were exported to Japan and harvesters received a portion of the profits.

2.4 Actors and their different approaches to commercialisation

Value chains are often driven by a variety of actors who have different motives for the commercialisation of NTFPs. From a livelihoods perspective, NTFP commercialisation is defined as "increasing the value of an NTFP in trade which is expected to increase income and employment opportunities, especially for poor and disadvantaged people" (Belcher and Schreckenberg, 2007: 356). Globally, this has increasingly become a motivation for government departments who hope to achieve rural poverty alleviation (Belcher et al., 2005). Therefore, commercially important NTFPs have often been the foundation from which policies around conservation and rural development have been built (Neumann and Hirsch, 2000). However, due to a decline in confidence in state institutions to effectively lead development and conservation efforts, non-government organisations (NGOs) have increasingly fulfilled this role.

NGOs are self-governing, private, non-profit organisations that are geared to improve social and natural systems (Gualandris and Pagell, 2015). Their main role in the commercialisation of NTFPs is "to develop economically viable supply chains that at a maximum creates no harm and may even have positive or regenerative impacts on social and environmental systems" (Gualandris and Pagell, 2015: 5). In order for sustained benefits to be derived from the commercialisation of NTFPs, all ecological components of commercial species need to be assessed. Thus, NGOs conduct research on the density, distribution, population structure, and dynamics of commercially important plants. They may additionally determine the most sustainable harvesting methods to maintain a sustainable supply of NTFPs and continued economic growth in rural areas (Wollenberg and Ingles, 1998). NGOs may also play a key role in ensuring that profits from the extraction and marketing of NTFPs are equitably shared along the value chain (Neumann and Hirsch, 2000). They often therefore oversee and facilitate commercial NTFP transactions between collectors and private businesses. However, the demand for NTFPs is often market dependent and therefore driven by the private sector.

Industries are often interested in NTFPs because of their unique properties and increased consumer demand for "natural" products (Belcher and Schreckenberg, 2007). Therefore, NTFPs are being used as ingredients in very sophisticated industries where a high degree of technological innovation is needed. This often takes place by companies which fall outside of the region where the product was harvested. According to Belcher and Schreckenberg (2007), goods that are exported outside of the country of origin tend to have significantly larger markets.

Wynberg (2006) developed four models of commercialisation to show the different ways NTFPs can be sold and the different actors involved in each process. The four models are: (1) the corporate model, (2) the honest broker model, (3) the NGO model, and (4) the state model. The corporate model refers to a situation where harvesters of NTFPs supply raw material directly to local traders who then supply this to exporting companies. Harvesters often operate independently or in conjunction with a "middleman". Harvesters are unaware of the volumes being traded and the price received per kilogram. They also have very little knowledge and training on sustainable harvesting methods. The honest broker model relates to a scenario where local NGOs support harvesters to become organised, develop sustainable resource management practices, purchase simple processing technology, and link harvesters with exporters. The exporter collects raw material directly from harvester communities for NTFPs and pays a premium price. In both models, the raw material is imported into other countries and processed further before it is sold to consumers. The NGO model depicts a situation where an NGO purchases raw material directly from harvester communities and exports it to buyers. The majority of the buyers are foreign and therefore a small portion of the raw material is sent to local markets. The purchase price of the raw material is similar to those in the other two models. Wynberg's (2006) fourth model, the state model, describes a scenario where government officials have a strong involvement in the commercialisation of NTFPs.

2.5 Environmental concern

The growing interest around NTFPs stems from the idea that the sustainable harvest of NTFPs is a less ecologically destructive alternative to timber harvesting thereby providing a platform for sustainable forest management and livelihood enhancement (Arnold and Pérez,

2001; Marshall and Newton, 2003; Ticktin, 2004; Shahabuddin and Prasad, 2004). It was also believed that because NTFPs could allow communities to gain economically, this incentive would encourage them to preserve the resource base (Murali et al., 1996; Arnold and Pérez, 2001; Dovie, 2003; te Velde et al., 2006; Avocèvou-Ayisso et al., 2009; Hernández-Barrios et al., 2014). There is, however, an increasing global concern that in many cases NTFPs are not being extracted sustainably, especially due to over-harvesting (Hall and Bawa 1993; Soehartono and Newton 2001; Shahabuddin and Prasad 2004).

With the increasing growth in NTFP commercialisation, extraction rates have begun to rise as a result of market forces (Hall and Bawa, 1993). The increased demand for certain products ultimately increases the volumes of the product extracted. This can lead to the continuing decline of NTFP populations in order to meet such demands (Hall and Bawa, 1993; Sinha and Bawa, 2002; Dovie, 2003; Ndangalasi et al., 2007). A study conducted by Ndangalasi et al. (2007), for example, found that the high demand for tea-harvesting baskets from a tea factory may have been significantly contributing to the depletion of the tree species harvested to make the baskets. It is due to such high demand that traditional low-impact patterns and techniques of resource extractions are being replaced with large-scale commercial extractions (Sinha and Bawa 2002; Dovie 2003). According to Soehartono and Newton (2001), *gaharu*, a fragrant resinous wood, is an NTFP in high demand as it is one of the most valuable NTFPs worldwide. To meet this demand, the harvesting practices of this resource have transformed to a level which may have detrimental effects on the survival of the species (Soehartono and Newton, 2001). These case studies demonstrate why assumptions about the extent to which the conservation-through-use approach promotes ecological sustainability in NTFPs have been questioned (Murali et al., 1996).

According to Newton (2008) and Avocèvou-Ayisso et al. (2009), in order for the conservation-through-use approach to be successful, five conditions need to be met: (1) the harvesting of wild products must be sustainable, ensuring that the population of the species harvested is maintained; (2) harvesting must not interact with secondary threats; (3) the commercialisation of the product must be economically feasible; (4) the harvesters must reap the benefits of the commercialisation of the wild products; and (5) income from NTFP commercialisation must be an incentive to conserve the resource being harvested. Another important condition which should be added to this list is the ability of harvesters to obtain

land and resource tenure rights. As noted by Belcher et al (2003), without secure tenure rights, harvesters are unable to make an adequate living due to the challenges associated with open access resource harvesting. To assess the sustainability of harvesting activities, the dynamics of species, communities, and ecosystems need to be understood (Hall and Bawa, 1993). According to Ticktin and Shackleton (2011), the harvesting of NTFPs can have an impact on multiple ecological scales, including: the individual, genetic diversity, population, community, and ecosystem. The most direct impacts of NTFP harvesting are on the size and composition of the individual harvested (Ticktin, 2004). This affects the survival, growth and reproduction of the product extracted (Shahabuddin and Prasad, 2004). The extraction of bark, for example, can lead to the weakening or death of the extracted species (Arnold and Pérez, 2001; Dovie, 2003; Ndangalasi et al., 2007). The type of species harvested will determine whether a continuous offtake can be sustained (Arnold and Pérez 2001). Furthermore - according to Boot and Gullison (1995), Ticktin and Shackleton (2011), and Hernández-Barrios et al. (2014), the harvesting of fruits, seeds, and short-lived leaves has a higher potential for sustainable harvest as compared to harvesting the whole plant, or its roots, bark and bulbs.

Harvesting strategies differ both across and within local communities. These strategies have consequences for the sustainability and productivity of NTFPs (Ticktin and Shackleton 2011). Different harvesting techniques employed by resource users that affect the size and composition of NTFPs include: the seasonal timing of the harvest, the timing of the harvest in the plant life cycle, the frequency of harvesting, the size of the individuals harvested, the intensity of the harvest, the method or tools used when harvesting, and the part of the plant harvested (Ticktin 2004). For example, a study done by Sinha and Bawa (2002) among the Soligas in south India found that a wide variety of methods to harvest the fruits of two focal tree species were used. These methods included either hitting large branches or cutting the small branches of the tree and collecting the fruit that fell to the ground, or cutting the large branches (and in some instances, the whole tree) to retrieve the fruit. It was found that these harvesting techniques negatively impacted the tree species: the cutting of branches reduced fruit production in subsequent years and the cutting down of trees was unsustainable because a high percentage of tree stumps died. Sinha and Bawa (2002) therefore concluded that such methods of extraction compromised the long-term sustainability of NTFP use. This case study demonstrates how, in some cases, rather than changing the timing and frequency of

NTFP extraction, assessing the current harvesting practices or adapting the techniques used is seen as a more useful and practical approach to sustainable natural resource use (Ticktin 2004).

2.6 Background to the Convention on Biological Diversity (CBD)

Just as there are significant benefits attached to the commercialisation of NTFPs, this is similarly true for genetic resources. Genetic resources are different to NTFPs in that the genetic material found in NTFPs can also be utilised for commercial benefits. Current understandings of genetic resources are often attributed to traditional knowledge held by local communities. Therefore, the way in which genetic resources are accessed and how the benefits of their use are shared can contribute to a fairer and more equitable economy that supports rural livelihoods and sustainable development (CBD, 2011a). Prior to 1993, access to genetic resources and the traditional knowledge associated with them was without any restrictions (UEBT, 2009b; Wekundah, 2012). Regulations were mainly focused on the prevention of pests, pathogens, and protected endangered species from being imported (Schindel et al., 2015). In this way, genetic resources and traditional knowledge were taken by users without the consent and approval of the resource holders and without compensating them (Richerzhagen, 2011; Wekundah, 2012). As a result of the monopolisation of benefits by developed countries, there was a growing concern that genetic resource providers who have traditionally held and safeguarded genetic resources in developing countries, were being exploited (UEBT, 2009b; Wekundah, 2012). The term "biopiracy" came to the fore and was defined as "the unauthorized extraction of traditional knowledge or biological resources and/or the patenting of inventions that derive from such knowledge or resources without any provision for sharing the benefits with the providers" (Dutfield, 2000: 278).

The Convention on Biological Diversity (CBD), an international agreement, was consequently implemented in 1993 with the aim of achieving three objectives: (1) the conservation of biological diversity, (2) the sustainable use of its components, and (3) the fair and equitable sharing of benefits arising from the utilisation of genetic resources (CBD, 2011a; CBD, 2011b). In September 2002, the World Summit on Sustainable Development (WSSD) called for the establishment of an international regime within the CBD. This international regime was intended to achieve the third objective of the CBD agreement (Richerzhagen, 2014). In 2002, the Bonn Guidelines on Access to Genetic Resources and Fair

and Equitable Sharing of Benefits Arising out of their Utilization were adopted under the CBD. These guidelines were recognised as a useful first step in the CBD's implementation of relevant provisions related to Access and Benefit Sharing (ABS) (Greiber et al., 2012). The Bonn Guidelines were intended to provide guidance on: identifying a range of measures to consider when implementing ABS specifications, identifying the main roles and responsibilities of users and providers, and providing a list of monetary and non-monetary benefits (Greiber et al., 2012; Richerzhagen, 2014). However, these guidelines did not achieve the envisioned success because their implementation was voluntary, and many contracting parties and ABS stakeholders criticised them as being incomplete, focusing too much on users and not taking into account the critical concerns of providers of genetic resources and/or associated traditional knowledge (Kamau et al., 2010; Greiber et al., 2012).

2.7 The Nagoya Protocol

After eight years of negotiations, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilisation was adopted in 2010 in Nagoya, Japan (CBD, 2011b; Cole, 2014). This protocol "covers genetic resources and traditional knowledge associated with genetic resources as well as the benefits derived from their utilisation" (CBD, 2011a: 35). According to the CBD (2010b), genetic resources include all living organisms (plants, animals, marine organisms, and microbes) which carry genetic material that could be potentially useful to humans. Thus, the Nagoya Protocol covers all bioprospecting activities – the exploration of biodiversity for genetic resources and biochemicals (Wynberg et al., 2015). The CBD (2011b: 4) defines the utilisation of genetic resources as the "research and development on the genetic and/or biochemical composition of genetic resources, including through the application of biotechnology". Article 2 of the CBD defines biotechnology as "any technical application that uses biological systems, living organisms or derivatives thereof to make or modify products or processes for specific use" (CBD, 2011). It is important to note that genetic resources used as bulk commodities (as is the typical use of biological resources and NTFPs) are excluded from the scope of the Nagoya Protocol (Greiber et al., 2012; Morgera et al., 2016). Article 7 of the Protocol strengthens the ability of local communities to benefit from their knowledge, innovations, and practices (CBD, 2011b). It does this by regulating the way in which genetic resources are accessed and how the benefits of their use are shared, with the intention that this creates an incentive for conservation and the sustainable use of natural resources (CBD, 2011a). A

further provision of the Protocol is that countries that provide genetic resources should be included in the financial profits (from product commercialisation) and non-monetary benefits (development of research skills and knowledge) of products derived from their natural resources (Rosenthal, 1997).

2.8 Conceptualising Access and Benefit Sharing (ABS)

ABS is based on a provider of genetic resources (Competent National Authority, community, or those owning the resources) granting Prior Informed Consent (PIC) to a user of the genetic resources (e.g. private companies or universities) and negotiations between the parties to develop mutually agreed terms (MATs) to ensure the fair and equitable sharing of benefits (CBD, 2010a; CBD, 2011a; MET, 2012). The use of genetic resources is often a complex process involving a number of actors and processes (CBD, 2010b). It is important to understand the distinction between providers and users because the first user may become a provider for another user (CBD, 2010b). Benefits derived from the use of genetic resources may include: the results of research and development which provide crucial information and understanding of the natural world, technology transfer, monetary benefits that arise from the commercialisation of products derived from genetic resources, or multiple other forms of non-monetary benefit-sharing (CBD, 2010a; CBD, 2010b). Therefore, the way in which genetic resources are accessed and how these benefits are distributed is supposed to create an incentive for the sustainable use and conservation of resources which can directly contribute to sustainable development (CBD, 2010b; Cole, 2014).

An important requirement of the CBD is for ABS to contribute to the conservation of biological diversity and the sustainable use of its components, linking to first two objectives of the convention - (1) the conservation of biological diversity and (2) the sustainable use of its components (Kamau et al., 2010). However, in practice, this approach has fallen short of what was expected – the degradation of biodiversity continues and very few benefits arising from the commercial use of biodiversity have been shared with the providers of biodiversity (Richerzhagen, 2011). This is attributed to the lack of incentives allocated for biodiversity conservation. According to Richerzhagen (2011: 2251) and Richerzhagen (2014: 148), “experience has shown that users of genetic resources are not willing to pay adequate compensation before a product is developed and distributed in the market. However, income

substitutions which change economic activities and limit actions damaging to biodiversity must be financed directly in order to be effective".

Traditional knowledge, innovations, and practices on plants, animals, insects, or ecosystems can provide interesting leads to the particular properties of genetic resources (Greiber et al., 2012). Therefore, the knowledge of local communities has often provided a platform for academic research and the development of commercial products, which is beneficial for humanity as a whole (CBD, 2010b). Indigenous and local communities depend on biological resources for a variety of purposes and therefore see themselves as custodians of such resources (CBD, 2010b). They have developed customary laws, values, and practices attached to traditional knowledge which guide how genetic resources are accessed, used, and conserved in order to meet community needs (Swiderska, 2009). Valuing and protecting traditional knowledge is a key component of the CBD and Nagoya Protocol's aim to ensure that local communities receive equitable benefits from the utilisation of genetic resources and/or associated traditional knowledge (CBD, 2010b). According to the CBD (2010b: 19), "in many cases the same properties that make [genetic resources] useful to indigenous and local communities are now used by industry to develop popular products". In the cosmetics sector in particular, consumers are increasingly favouring natural ingredients which has led to a much greater use of genetic resources and associated traditional knowledge for the sector (Laird and Wynberg, 2012).

2.9 ABS and biotrade

The main distinction between ABS (utilisation of genetic resources) and biotrade (utilisation of biological resources) is the intended use of the resources. As stated previously, the utilisation of genetic resources (as defined by the Nagoya Protocol) is "to conduct research and development on the genetic and/or biochemical composition of genetic resources, including through the application of biotechnology" (Morgera et al., 2016). Biotrade, on the other hand, sees "utilisation as a commodity" (PhytoTrade Africa, 2015) and is therefore much broader, applying to all biodiversity, including species and ecosystems (UNCTAD, 2016). It is important to note, however, that ABS rules under the Nagoya Protocol are not self-executing and provider countries can define and implement national ABS and/or biotrade regulatory frameworks which best support their country's needs (CBD, 2015). India, for example, has developed broad ABS legislation, including all activities that utilise biodiversity

components (including biological resources) for any intended purpose, including commercialisation (UNCTAD, 2016). Similarly, in South Africa, the *Biodiversity Act 10 of 2004* defines indigenous biological resources very broadly as "any living or dead animal, plant or organism of an indigenous species, any genetic material or derivatives of such organisms, or any chemical compounds and products obtained through the use of biotechnology" (RSA, 2004). Therefore, the definition of bioprospecting – "any research on, or development or application of, indigenous biological resources for commercial or industrial exploitation" – is also broadly defined to include biological resources (DEA 2012: 59).

Efforts to combine bioprospecting and biotrade have often negatively affected harvester communities, traditional knowledge holders, and industries creating economic opportunities. For example, the commercialisation of *Pelargonium sidoides* raw material in South Africa could be considered biotrade, but because of the broad definition of bioprospecting, the *Pelargonium* industry is subject to conditions of the national ABS legislative framework (Wynberg et al., 2015). The consequent staff time and travel expenses incurred in developing benefit sharing agreements put companies off from entering into the trade. In addition, delays with issuing bioprospecting permits have deterred potential international investors which had negative impacts on investment for the industry (Wynberg et al., 2015). Due to the strict ABS regulations in South Africa, companies have invested in the cultivation of *Pelargonium* in other developing countries. This means that harvesters have lost any potential financial benefits promised by ABS through the cultivation of the resource (Wynberg et al., 2015).

It has been understood that there is a need to regulate biotrade activities when large volumes are traded, where there are opportunities to add value, or where traditional knowledge is involved, however critics believe these should be separate to measures for bioprospecting and the use of genetic resources defined by the Nagoya Protocol (PhytoTrade Africa, 2015). Addressing the two activities in the same way could have adverse impacts on economic opportunities available to harvesters and associated industries in the country (PhytoTrade Africa, 2015). As Figure 2 emphasises, biotrade and bioprospecting are two separate approaches, each consisting of different laws, policies, quality requirements, role players and natural resource uses and therefore cannot be regulated in the same way. In addition, the

figure also illustrates the overlap between biotrade and bioprospecting, depicting where biotrade moves into the bioprospecting sphere.

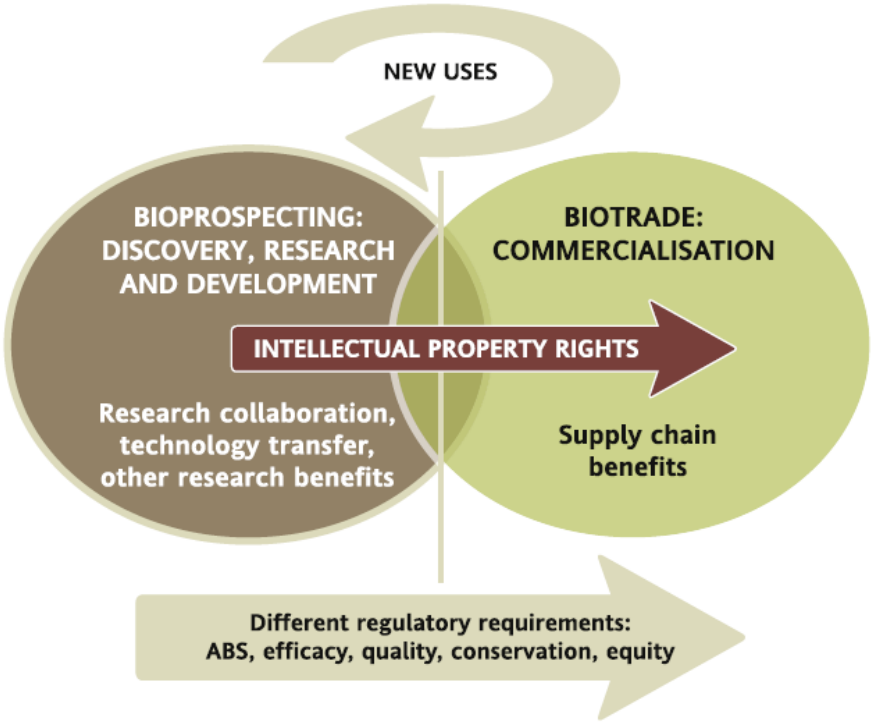


Figure 2: Distinctions and overlap between bioprospecting and biotrade (Wynberg, 2016).

Regulating biotrade and bioprospecting in the same way is of particular concern, especially for species that can be used in different ways by different sectors. The commercialisation of the resurrection bush, which is the focus of this study, is an example of one of these species.

2.10 The resurrection bush – a new harvested resource

Myrothamnus flabellifolius, more commonly known as the "resurrection bush", belongs to the family Myrothamnaceae, and is an angiosperm related to the genus of the oldest flowering plants, *Gunnera* (IRDNC, 2016). This single genus comprises of only two species – *Myrothamnus flabellifolius* and *Myrothamnus moschatus* (Glen et al., 1991). *Myrothamnus moschatus* is endemic to Madagascar and differs from the resurrection bush in terms of its leaves, flowers and inflorescences (Glen et al., 1991; Gechev et al., 2014). The name *Myrothamnus flabellifolius* is derived from the aromatic properties of the plants unique shaped leaves. The Latin terms *myron* means "aromatic", *thamnos* meaning "bush", and *flabellifolius* meaning "fan-like leaves" (Moore et al., 2007a). The resurrection bush is a

woody shrub ranging between 0.5 m and 1.5 m tall and grows on isolated, exposed rock outcrops or rock plateaus throughout southern Africa (Moore et al., 2007a). It therefore prefers well-drained, nutrient-deficit surfaces that receive extremely high temperatures, irregular precipitation, and high light exposure (IRDNC, 2016). The resurrection bush has the ability to survive under these conditions as it can dehydrate its vegetative tissue (losing more than 95% of its water) and exist for months or years in an air-dried, dormant state (Moore et al., 2007a; IRDNC, 2016). When water is provided to the roots, the plant rehydrates its desiccated tissue and resumes its original state within a few hours (Moore et al., 2007a). The species therefore belongs to the group of desiccation-tolerant plants commonly referred to as "resurrection plants" (Engelhardt et al., 2007). The only definitive sign that the resurrection bush has died is when it loses its leaves (Glen et al., 1991).

Myrothamnus flabellifolius can occur singularly, but often grows in dense stands or colonies (IRDNC, 2016). The leaves have very strong aromatic characteristics and, together with the twigs, are used in a variety of different medicinal preparations (Nako, 2014). The unnoticeable flowers are produced in summer with male and female flowers on separate plants (van Wyk et al., 1997). The very small seeds of the resurrection bush, also called "dust seeds", are dispersed by wind (Glen et al., 1991). Disjointed populations have been found along the west coast of Angola and Namibia and have also been found to occur in Mozambique, Malawi, Tanzania, Zimbabwe, South Africa, Botswana, and Kenya (Figure 3) (IRDNC, 2016). The Angolan and Namibian *Myrothamnus flabellifolius* are geographically separated from the South African populations by the Kalahari Desert; investigations are thus underway as to whether these are two distinct species (IRDNC, 2016). This separation may be due to a combination of geographical (desert, inselbergs) and climate conditions (rainfall variation) that prevent gene flow between the two populations (Moore et al., 2007b).

South African and Zimbabwean plants occur in regions that receive annual summer rainfall and have been found to grow on rock plateaus where water run-off is rapid (Moore et al., 2007b). These flat rock plateaus consist of granite, shale, quartz, and sandstone (Moore et al., 2007b). In Namibia, the resurrection bush is reported to occur in much more arid regions, experiencing irregular summer rainfall every two years or more (Moore et al., 2007b). As a result, these plants grow on rock inselbergs with crevices in the rock face that trap water so that the plant can rehydrate itself after long periods of desiccation (IRDNC, 2016; Moore et

al., 2007b). Efforts to cultivate the resurrection bush have for years proven to be very difficult (Glen et al., 1991).

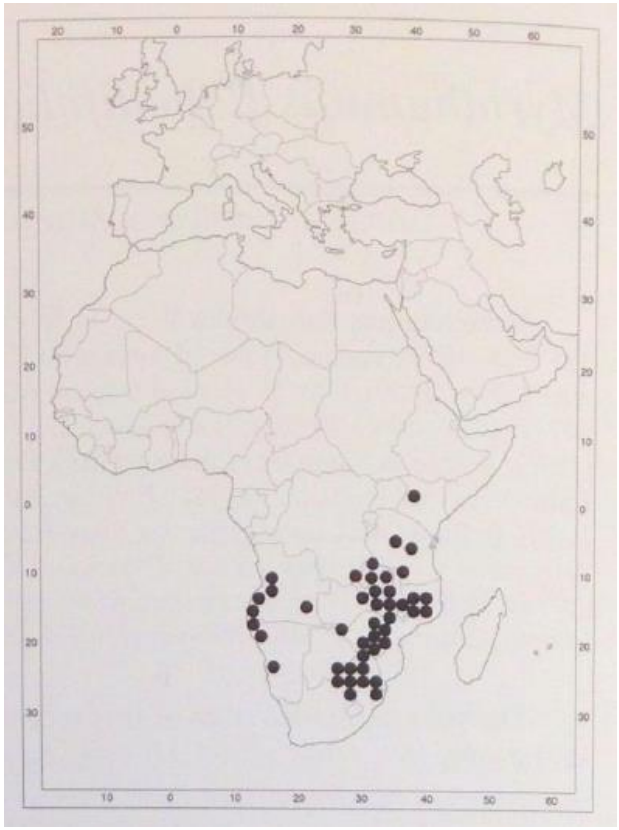


Figure 3: Known geographical distribution of the resurrection bush (*Myrothamnus flabellifolius*) (Glen et al., 1991).

Myrothamnus flabellifolius has been used traditionally by many ethnic communities residing in Africa (van Vuuren, 2007). It is one of many species that is used to treat more than one disease (Setshogo and Mbereki, 2011). According to Watt and Breyer-Brandwijk (1962), early Rhodesian settlers used a decoction of the leaves and stalk of the resurrection bush to alleviate pain. The Pedi in the Free State province of South Africa either inhale the smoke from burning leaves or smoke the young leaves in pipes to treat chest pains and asthma (Watt and Breyer-Brandwijk, 1962; Hutchings 1996; van Wyk et al., 1997). In Zimbabwe, it has also been recorded that smoke from resurrection bush leaves is directed into the vagina to treat pain in the uterus (van Wyk and Gericke, 2000). The Karanga of western Zimbabwe and north-eastern Botswana chew the leaves for the treatment of scurvy, halitosis, and Vincent gingivitis (Watt and Breyer-Brandwijk, 1962). When someone is very ill, they bath and wash themselves in water where the resurrection bush has revived itself and turned green.

Shona healers administer medicines from the resurrection bush to treat epilepsy, madness, coughs, and abdominal pain (Hutchings, 1996). Tonic and teas made from the dried leaves have also been used for the treatment of breast diseases in central Africa (Watt and Breyer-Brandwijk, 1962; Hutchings, 1996). The leaves of the resurrection bush mainly contain camphor and eucalyptol and their use has often been recorded as a medicinal tea. It is also used to flavour normal tea or as a spice (van Wyk and Gericke, 2000; Ketlhoilwe and Jeremiah, 2016). According to Gelfand (1985) and van Wyk et al. (1997), some uses include infusions drunk for colds and respiratory ailments, and decoctions taken to alleviate backache, kidney problems, haemorrhoids, and painful menstruation. A lotion of the leaves can also be used externally to treat abrasions and dried powdered leaves can be used to dress burns and wounds (van Wyk et al., 1997; Koenen, 2001). Root decoctions are ingested for headaches and ulcers (Hutchings, 1996). In Angola, powdered leaves of the resurrection bush are mixed with fat to grease one's skin (Watt and Breyer-Brandwijk, 1962). Two studies were conducted in 2010 and 2011 with traditional healers in the Limpopo province of South Africa. The 2010 study found that the resurrection bush was used in conjunction with other species to treat erectile dysfunction (Semenya et al., 2013; Erasmus et al., 2015). The 2011 study found that the resurrection bush was one of the most commonly used species to treat tuberculosis (TB) (Semenya and Maroyi, 2013). The resurrection bush has also been used as a symbol of hope in African traditional psychological treatment and against severe depression (Viljoen et al., 2002). According to Foden (2009), Zulu *isangomas* have been using the resurrection bush for years to treat depression, bereavement and heartache.

In 2015, an NGO in Namibia conducted a study to determine the most sustainable method for harvesting the resurrection bush (IRDNC, 2016). Four different methods were tested: (1) removing all twigs and branches half way up the main stem, (2) removing half of the twigs, (3) removing all the leaves, and (4) cutting off twigs using clippers. Data from the control site showed that after two growing seasons (two years), the resurrection bush only grew approximately 7 cm. This is supported by Douie et al. (n.d.), who highlighted that the resurrection bush is an extremely slow-growing species. It was reported in some control sites that the length of the plants decreased in size (IRDNC, 2016). Those that were harvested showed the greatest increase in length after two years, which may indicate that the cutting or breaking of twigs stimulates growth. The production of flowers and seeds was however negatively impacted by harvesting. In cases where half of the twigs were harvested, flowers and seeds were only produced on parts of the plant where harvesting did not occur. Flowers

and seeds did not produce on new growth. The study found that the most sustainable method for harvesting was to remove a portion of the twigs, preferably only new growth. Douie et al. (n.d.) suggest that factors such as the slow growing nature of the species, the unique dormancy period of the plant, the shallow soils in which it grows, and the difficulty with monitoring harvested twigs makes the harvesting of the resurrection bush an unsustainable practice. Because the species is slow-growing, cultivating the resurrection bush is also a very time-consuming exercise, resulting in majority of the species being sourced from the wild.

Recent research on the species has shown that an essential oil of the resurrection bush exhibits antimicrobial and antibacterial properties which could provide evidence for the traditional uses associated with the species and its pharmaceutical rationale (Viljoen et al., 2002). A major essential oil component of the resurrection bush is used in Ozopulmin™, a pharmaceutical preparation to treat respiratory tract disorders such as asthma (Viljoen et al., 2002). A study carried out by Brar et al. (2018) found that compounds present in a resurrection bush extract could be potentially useful as a source of non-toxic, targeted anti-triple negative breast cancer agents to complement existing anti-triple negative breast cancer treatment regimes. Similarly, Fultang et al. (2018) found that the resurrection bush shows significant anticancer activity with a minimal effect on normal cells. Dhillon et al. (2014: 32) state that "the identification of the anticancer properties of the resurrection bush offers an edible, plant-based treatment option for leukemia". Chinsembu and Hedimbi (2009) performed a study on plant species with anti-HIV (Human Immunodeficiency Virus) active compounds. The resurrection bush contains galloyquinic acids, which are known to be active against HIV reverse transcriptase and replication. It was therefore concluded that such species could be developed into newer drugs to manage HIV/AIDS (Acquired Immune Deficiency Syndrome). In addition, Lin et al. (2014) found that a proanthocyanidin-enriched extract from the resurrection bush is reported to inhibit herpes simplex virus type 1. The sugary substance produced in the cells of the resurrection bush during drought is called "trehaloses". This substance allows for the species to completely dry out and revive without damage. A company in Cambridge called Biostability Ltd developed a fridge-free vaccine by spraying the vaccines with a trehaloses coating, which hardens the living material inside the vaccines and preserves them unrefrigerated for months (Direction, 2008).

The resurrection bush could also have "novel uses in horticulture such as replacing high-water use landscape ornamentals to significantly reduce the need for irrigation water in

managed landscapes" (Berjak et al., 2007: 8). The glyceryl glucosides naturally produced by the resurrection bush have been patented and used by Bitop AG (the producers of Glycoin® natural) for increased skin elasticity, moisturising, and the reduction of symptoms of itching, burning, tightness, tingling, and dryness (Schagen et al., 2017). Using the resurrection bush sourced from the drier parts of Pretoria, a Switzerland-based company, Rahn AG, has developed an extract called Myramaze® (Vorster, 2014). According to Rahn AG, "Myramaze acts like an oasis for stressed and dry skin, rehydrating and regenerating skin, and invigorating it for more than 48 hours after application" (Vorster, 2014). Dr Rimpler's sensitive skin care toner, formulated for sensitive and allergic skin, contains Myramaze®. BASF, a German chemical company with offices in more than 80 countries, manufactures skin care products that contain a resurrection bush extract sourced from a company in Kwa-Zulu Natal (KZN).

Table 1 shows a list of patents filed that contain the resurrection bush. A total of 15 patents for *Myrothamnus flabellifolius* have been documented to date. This information is critical to ensure that the commercial use of the resurrection bush and/or associated traditional knowledge has not been uncompensated through claimed innovations derived from such knowledge and/or resource. Fourteen of these patents fall under the cosmetic sector and relate to skin application. The other patent covers plants that produce trehalose – the resurrection bush being one – and its use to protect staple crop plants against drought, high salinity, or temperature extremes and for improving the storage properties of harvested plants, including green food stuffs, picked fruits, and ornamental plants. The majority (8) of the patents have been filed by Chinese companies for anti-aging purposes. Based on a thorough online search, to date there have been no patents filed in southern Africa that contain the resurrection bush.

Table 1: Patents filed containing the resurrection bush (Adapted from Espacenet, 2017).

Patent number	Year	Use of the resurrection bush	Location
CN107714554 (A)	2018	Natural plant toning lotion, and extracting and deep processing process thereof	China
CN107412042 (A)	2017	Cosmetic composition with functions of repairing and strengthening skin barrier and	China

		application	
CN107334680 (A)	2017	*Myrothamnus flabellifolius* moisturizing restoring mask	China
CN107198675 (A)	2017	Double-layer essence with repair and anti-aging functions, method for preparing double-layer essence and application thereof	China
CN106821843 (A)	2017	Anti-ageing composition comprising *Myrothamnus flabellifolius* extract and preparation method thereof	China
CN106726743 (A)	2017	Additive-free safe skin care mask capable of being used by pregnant women and preparation method thereof	China
CN106265348 (A)	2017	Matrix with skin barrier repairing and anti-aging effects and preparation method and application thereof	China
CN106074663 (A)	2016	Plant extracts and hormone-dependent dermatitis repairing cream	China
KR20160068310 (A)	2016	Cosmetic composition comprising *Myrothamnus flabellifolius* extracts for protecting skin from stress due to harmful environment	South Korea
KR20160008942 (A)	2016	A composition comprising fermented *Myrothamnus flabellifolius* extract and the use thereof	South Korea
FR2997853 (A1)	**2014**	Reducing or delaying the	L'Oréal Paris, France

		thinning of skin and the sagging of skin and stimulating cellular metabolism of keratinocytes, comprises applying effective quantity of an extract of *Myrothamnus flabellifolius* to skin	
KR20120110453 (A)	2012	Skin external composition containing *Myrothamnus flabellifolius* callus extract	South Korea
WO2011006938 (A1)	2011	Use of proanthocyanidins for production of an antiadhesive preparation	Germany
US2007134193 (A1)	2007	Cosmetic and/or pharmaceutical preparations	BASF, France
US6130368 (A)	2000	Transgenic plants producing trehalose	UK

2.11 Conclusion

For decades, the subsistence use and biotrade of NTFPs has played a vital role in assisting rural communities with additional cash income and food security. Increasingly over the years national government and NGOs have promoted the sustainable harvest of NTFPs with the aim to alleviate poverty and unemployment in rural areas. More recently, businesses have expressed interest in NTFPs because of their unique properties and a larger consumer demand for "natural" products. As a result, natural resources are being increasingly harvested for large commercial markets across the globe. The CBD and Nagoya Protocol both form part of the international regime on Access and Benefit Sharing. The main objective of the Nagoya Protocol is to safeguard local communities and ensure that they receive fair and equitable benefits from the commercialisation of genetic resources. The resurrection bush is a species used for commercial purposes across southern Africa and therefore is subject to national ABS regulatory requirements. The following chapter will discuss the methods used, the study sites chosen, and the ethical considerations adopted for this research.

3. Chapter 3 - Methodology

This study adopted a qualitative case study methodological approach. According to Yin (1989), a "case" refers to an event, an entity, an individual, or a unit of evaluation. It is an empirical inquiry (based observation or experience rather than theory or pure logic) that investigates a contemporary and complex phenomenon in its real-life context using multiple sources of evidence (Noor, 2008: 1602). Therefore, case studies combine a number of data collection methods – such as interviews, questionnaires, and observations – from a variety of individuals (Eisenhardt, 1989). Case studies are not intended to study a whole organisation but rather a particular issue, feature, or unit of analysis (Noor, 2008). This type of research approach is useful when wanting to get an in-depth, holistic understanding of a particular event or situation (Noor, 2008). With this in mind, this methodological approach was adopted for this study to get a comprehensive understanding of the different Access and Benefit Sharing (ABS) and biotrade commercialisation approaches associated with the resurrection bush. Each commercialisation approach was examined in detail and all actors involved were included in this research using a variety of data collection methods.

3.1 Data collection

3.1.1 Methods used

The range of data collection methods used for this study included observations, semi-structured interviews, and key informant interviews. Observing participants was a method used to observe phenomena of interest in the environment studied to draw information which would not have been attainable from other methods (Noor, 2008). This method was employed throughout the study to document the traditional uses of the resurrection bush, the harvesting techniques used by collectors, and the storage and processing procedures of the raw material. Semi-structured interviews were carried out with harvesters of the resurrection bush and key informants. Marshall (1996: 92) defines a key informant as "an expert source of information". This research approach is not a random sample of individuals that fall within the scope of the study, but rather selective sampling of individuals with specialised knowledge (Tremblay, 1957). Therefore, key informant interviews provide the necessary information, ideas, and insights on a particular subject (Kumar, 1989). The semi-structured interviews used were formulated prior to conducting the field work. The interviews consisted of a set of predetermined, open-ended questions, with other questions emerging during the

interview with the participants (DiCicco-Bloom and Crabtree, 2006). Each interview allowed for an in-depth analysis of social and personal matters relating to the traditional knowledge, harvesting methods and processing procedures associated with the resurrection bush, each of which took approximately 30 minutes to an hour to complete (DiCicco-Bloom and Crabtree, 2006). Pseudonyms have been used for all key informants who took part in this research.

3.1.2 Study sites

Three countries were chosen in which to conduct this research – Namibia, Zimbabwe and South Africa. Within each of these countries, certain areas were targeted to facilitate data collection pertaining to the commercialisation of the resurrection bush. The selected study sites described below are not the only areas where the commercialisation of the species takes place and therefore do not provide an all-encompassing representation of resurrection bush commercialisation activities.

Namibia

In Namibia, four conservancies – Orupembe, Sanitatas, Otjiu-West, and Otjitanda – were chosen as the focus of this study site. These four conservancies were of particular interest because they all consist of an abundance of the resurrection bush and because they all represent social variation in terms of knowledge of the species and traditional versus modern lifestyles.

Orupembe conservancy and community forest

Orupembe (Figure 4) was registered as a conservancy in July 2003 and a community forest in August 2012. It covers a total land area of 3 565km^2 and is situated on the eastern border of the Skeleton Coast National Park (IRDNC, 2016; NACSO, 2018). It is the most western conservancy in the Kunene region, receiving a mean annual rainfall of less than 100mm per year (NACSO, 2018). The landscape is mountainous, particularly on the eastern side of the conservancy. Orupembe is one of the largest conservancies with a sparse population of only 240 inhabitants, all of whom are Ovahimba (NACSO, 2018). Currently, registered harvesters in this conservancy are involved with the commercial harvesting of *Commiphora wildii* resin, *Commiphora tenuipetiolata* gum, *Sarcocaulon mossamedense* wax and *Myrothamnus flabellifolius* (Fennessey, 2013; IRDNC, 2016).

Figure 4: Orupembe conservancy and community forest (NACSO, 2009a).

Sanitatas conservancy and community forest

Sanitatas (Figure 5) was registered as a conservancy in July 2003 and a community forest in August 2012 (Fennessey, 2013). The land area of this conservancy is 1 446 km^2 and it receives an average of less than 100mm per year of rainfall. It is largely semi-desert and sparse savannah – hills, plains, and wooded river valleys make up the landscape (NACSO, 2018). There are a total of 124 inhabitants in this conservancy, all of whom are Ovahimba people. Registered harvesters in the Sanitatas conservancy are involved with the commercial harvesting of *C. wildii* resin, *C. tenuipetiolata* gum, *S. mossamedense* wax, and *Myrothamnus flabellifolius* (Fennessey, 2013).

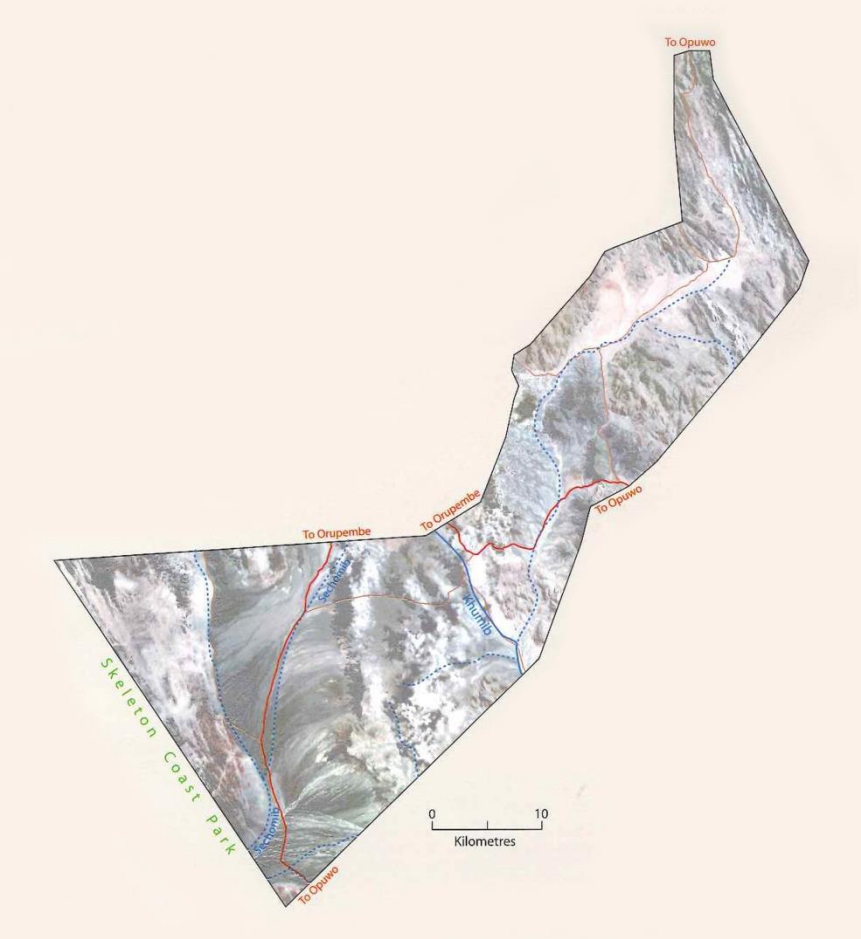


Figure 5: Sanitatas conservancy and community forest (NACSO, 2009b).

Otjiu-West conservancy and community forest

Otjiu-West (Figure 6) was registered as a conservancy in April 2012 and a community forest in August 2012. This conservancy covers a land area of 1 100 km^2 which is occupied by approximately 800 people, making it one of the more populated conservancies in Namibia (IRDNC, 2016; NACSO, 2018). All members of this conservancy are Otjihimba speaking, and most are nomadic pastoralists. The conservancy falls within three mountainous regions separated by wide plains and the Hoarusib River (IRDNC, 2016). Registered harvesters of this conservancy currently commercially harvest *Colophospermum mopane* seeds, *C. tenuipetiolata* gum, and *Myrothamnus flabellifolius* (Fennessey, 2013). *Ximenia*, also known as "sour plum" or "wild plum", is currently being investigated as an additional income opportunity for Otjiu-West conservancy members.

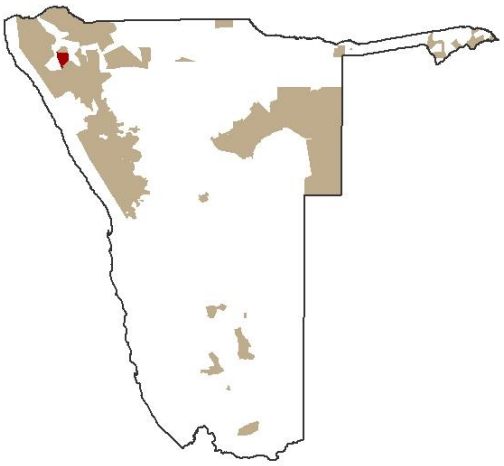


Figure 6: Otjiu-West conservancy and community forest (NACSO, 2016a).

Otjitanda conservancy

Otjitanda (Figure 7) was registered as a conservancy in 2011 and is in the process of registering as a community forest. This conservancy covers a land area of 1 174 km^2 and is occupied by a population of 474 people (NACSO, 2018). Otjitanda conservancy is predominately mountainous, except in the south where the topography consists mainly of gentle slopes (IRDNC, 2015). It is in this southern part of this conservancy where the majority of the conservancy's small population live (IRDNC, 2016). Until 2018, Otjitanda had not taken part in any commercial harvesting activities in the past but are now involved with the commercial harvest of the resurrection bush.

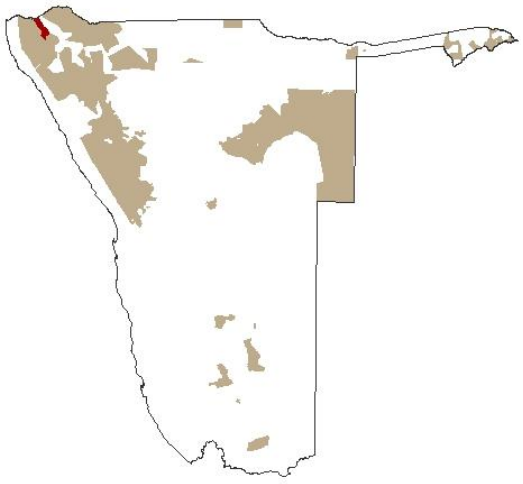


Figure 7: Otjitanda conservancy (NACSO, 2016b).

Zimbabwe

Chivi district

Chivi district falls under the Masvingo province and comprises a total of 29 wards which are home to 170 villages (Mvumi et al., 1998). Chivi (3 510 km^2) is located in the south-central part of Zimbabwe and receives low and unreliable rainfall, with an average of 530mm per year (Mapanda and Mavengahama, 2011). It is therefore characterised as having poor crop productivity and food insecurity (Mapanda and Mavengahama, 2011). As a result, the land is not conducive for agricultural production and competition for natural resources is prominent (Nemarundwe, 2000). Chivi district consists predominantly of communal land (89.7%), followed by resettlement land (9.7%) and small-scale commercial farming (0.6%) (Mvumi et al.1998). According to the population census in 2012, Chivi district constitutes 11.2% of the Masvingo province's population – with 54.3% of the district being female (ZimStat, 2012). In 2000, it was recorded that most of the Chivi population were either Shona or Ndebele speaking, with very different ethnic backgrounds (Nemarundwe, 2000). Because of these differences, the groups have different belief systems and patterns of resource use (Nemarundwe, 2000). Ward 16 of Chivi district (Figure 8) was chosen as the study site for this research because it was found to have an abundance of the resurrection bush (Figure 9). Non-governmental organisations (NGOs) have also worked with harvesters in this area for many years and have since developed strong relationships with them. Because the distribution of the resurrection bush is so widespread (Figure 9), however, it is also collected in other parts of the country for different purposes.

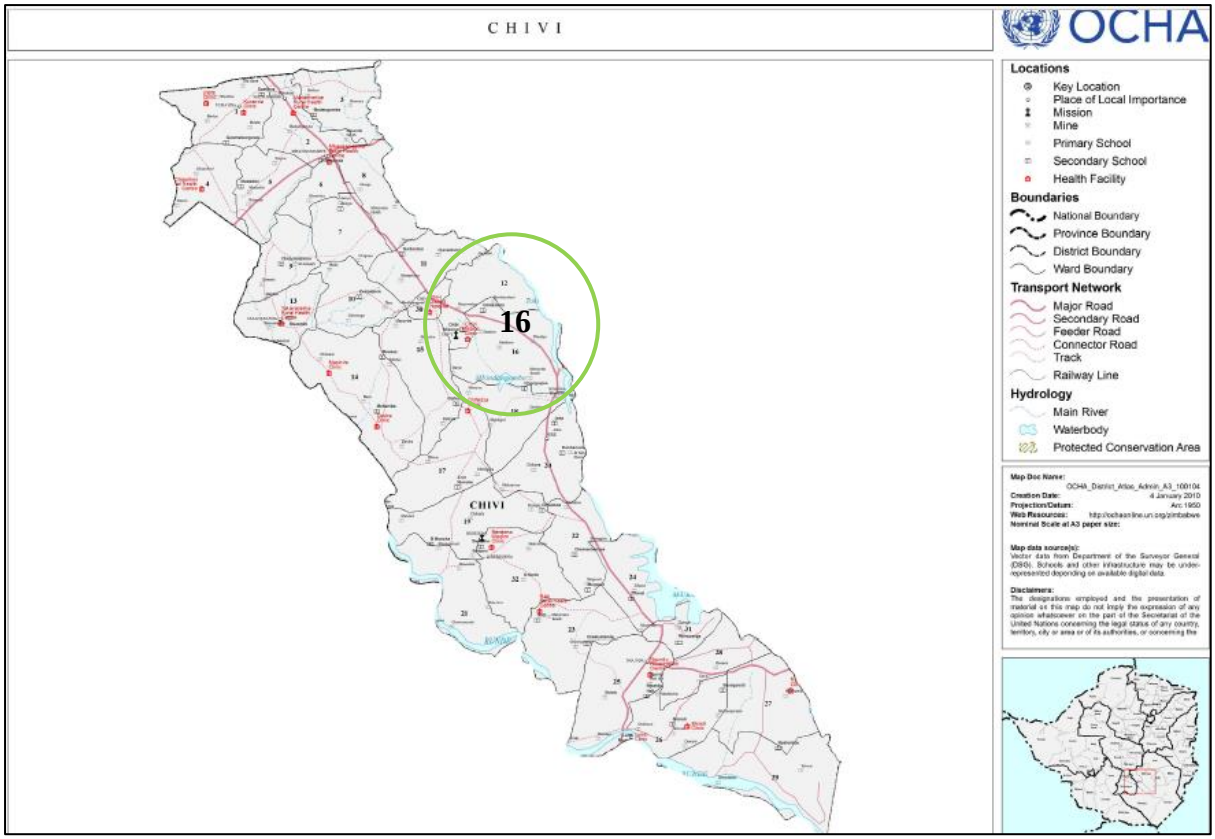


Figure 8: Ward 16, Chivi District (OCHA, 2008b).

Figure 9: Current known distribution of the resurrection bush (*Myrothamnus flabellifolius*) in Masvingo Province (Flora of Zimbabwe, 2018).

South Africa

According to Figure 10, the resurrection bush occurs in five provinces in South Africa: Gauteng, Kwa-Zulu Natal (KZN), Mpumalanga, Limpopo, and the North West. To the best of my knowledge, no harvesting of the resurrection bush takes place in these areas and therefore this research focused on parts of South Africa where there were activities relating to the commercialisation and trade of the species. This includes a resurrection bush cultivation nursery in Gauteng and an informal market in northern KZN that sells the plant. However, permission was not granted to visit the main resurrection bush cultivation site in Gauteng and due to safety concerns, the informal market in KZN was not visited. Fieldwork in South Africa was therefore limited to key informant interviews with those that had knowledge of the cultivation nursery and informal market.

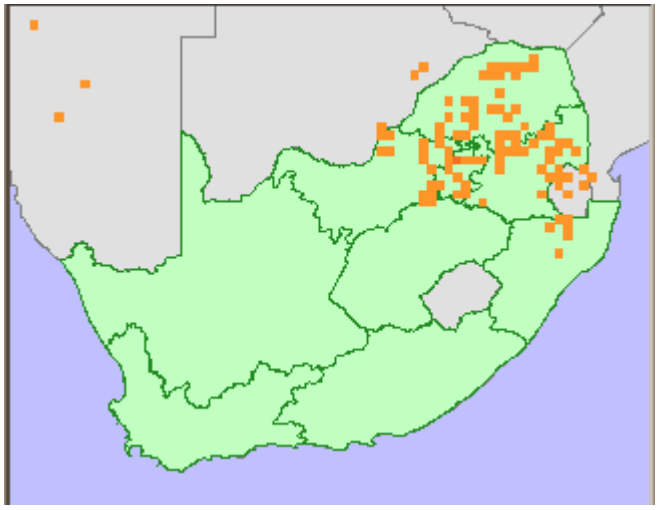


Figure 10: Distribution map of the resurrection bush (*Myrothamnus flabellifolius*) in South Africa (Williams et al., 2008).

The cultivation nursery (Figure 11) in Gauteng is based in Pretoria, approximately 65 kilometres outside of Johannesburg. Permission to visit the nursery was not granted due to the confidentiality of the cultivation techniques used (owner, pers.comm., July 5).

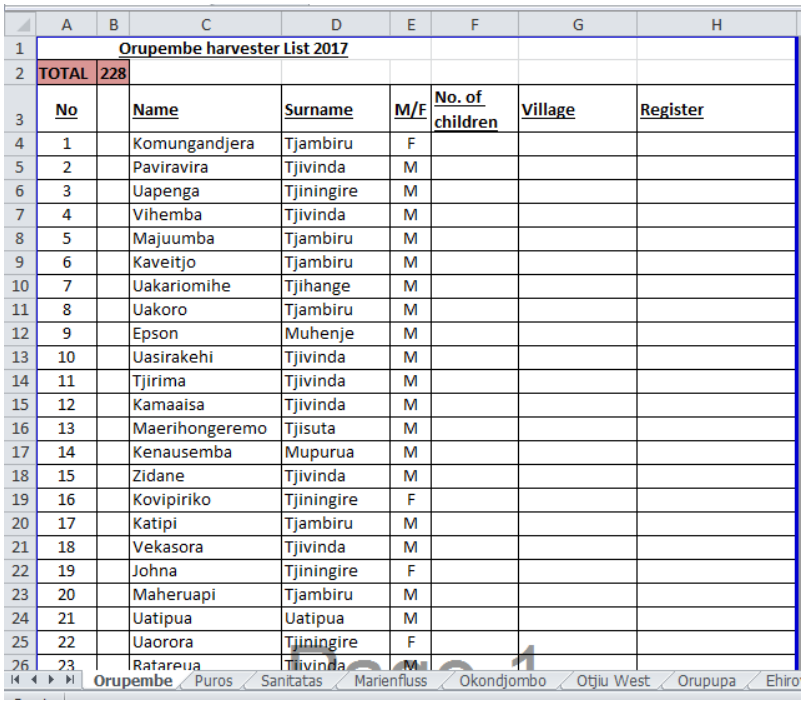
Figure 11: Cultivation nursery of several thousand specimens in Gauteng, South Africa.

The informal trading market in northern KZN is referred to as the "Mona market". It only takes place in the third week of every month for four days. It is described as "a huge market where cattle are auctioned and traders from far and wide bring their wares for sale" (Eshowe, 2018). Zululand Route 66 (2018) describes the market as "traditional" where everything from "decomposed giraffe heads to hippo tusks are for sale". As mentioned, due to safety concerns expressed by numerous informants, this market was not visited (John Walker 2018, pers.comm., May 30; Louise Black 2018, pers.comm., June 12).

3.1.3 Data collection

Semi-structured interviews

Data collection in Namibia took place from September to October 2017. During this time, I was employed by Integrated Rural Development and Nature Conservation (IRDNC) as an intern. IDRNC is a non-profit organisation in Namibia which promotes the harvest and sale of high-value plant resources to provide local communities with income to supplement other livelihood strategies (IRDNC, 2011). A pilot study was conducted with harvesters and it was found that no amendments to the questionnaire were required. All interviews carried out in Namibia were completed in consultation with IRDNC. A spreadsheet was compiled by the NGO showing the total number of registered harvesters for each conservancy in the Kunene region. Figure 12 is an example of the total number of harvesters for Orupembe conservancy.



	A	B	C	D	E	F	G	H
1	Orupembe harvester List 2017							
2	TOTAL	228						
3	No		Name	Surname	M/F	No. of children	Village	Register
4	1		Komungandjera	Tjambiru	F			
5	2		Paviravira	Tjivinda	M			
6	3		Uapenga	Tjiningire	M			
7	4		Vihemba	Tjivinda	M			
8	5		Majuumba	Tjambiru	M			
9	6		Kaveitjo	Tjambiru	M			
10	7		Uakariomihe	Tjihange	M			
11	8		Uakoro	Tjambiru	M			
12	9		Epson	Muhenje	M			
13	10		Uasirakehi	Tjivinda	M			
14	11		Tjirima	Tjivinda	M			
15	12		Kamaaisa	Tjivinda	M			
16	13		Maerihongeremo	Tjisuta	M			
17	14		Kenausemba	Mupurua	M			
18	15		Zidane	Tjivinda	M			
19	16		Kovipiriko	Tjiningire	F			
20	17		Katipi	Tjambiru	M			
21	18		Vekasora	Tjivinda	M			
22	19		Johna	Tjiningire	F			
23	20		Maheruapi	Tjambiru	M			
24	21		Uatipua	Uatipua	M			
25	22		Uaorora	Tjiningire	F			
26	23		Batareua	Tjivinda	M			

Orupembe | Puros | Sanitatas | Marienfluss | Okondjombo | Otjiu West | Orupupa | Ehiro

Figure 12: Total number of harvesters for Orupembe conservancy

Table 2: Sample size of harvesters involved in this study, per conservancy

Conservancy name	Total number of harvesters	10% representative sample	Total number of harvesters interviewed
Orupembe	228	23	33
Sanitatas	84	8	21
Otjiu-west	175	18	42
Otjitanda	*Have not done any commercial harvests*	20	28
TOTAL	487	49	124

A representative sample (10 %) of all harvesters in each of the four conservancies was then calculated to determine the sample size for each conservancy (Table 2). The most accessible villages in each of the conservancies were targeted and all of the resurrection bush harvesters available at the time were interviewed. As shown in Table 2, harvester interviews exceeded the 10% sample size allocated for each conservancy because all resurrection bush collectors present participated in this research. Otjitanda conservancy has only been involved in trial harvesting activities and therefore a commercial harvester list had not yet been compiled. All

resurrection bush harvesters who were available and had taken part in the trial harvesting activities were therefore interviewed.

In Zimbabwe, data was collected in May 2018 in association with Bio-Innovation Zimbabwe (BIZ), a non-profit organisation who works with local communities to assist with the knowledge sharing and commercialisation of underutilised, indigenous plants in Zimbabwe (BIZ, 2013). A pilot study was conducted with harvesters beforehand to assess the usability of the questionnaire. It was found that no changes the questionnaire were needed. Ward 16 of Chivi district only has a small, active group (approximately 25) of resurrection bush harvesters, 13 of whom were interviewed.

In South Africa, interviews were conducted intermittently between 2017 and 2018. However, it was found that for the duration of this research, no active harvesting of the resurrection bush was taking place for commercial use in South Africa and therefore no harvesters were interviewed.

In total, 124 semi-structured interviews were carried out with harvesters (Annexure 3) from Orupembe, Sanitatas, Otjiu-West, and Otjitanda conservancies. Purposive sampling was adopted to study a certain cultural domain with knowledgeable experts within it (i.e harvesters of the resurrection bush) (Tongco, 2007). According to Tongco (2007: 147), this sampling technique involves "the deliberate choice of an informant due to the qualities the informant possesses". In this case, the purposive sampling was based on the grounds that harvesters had received training from the trial harvest and were involved in commercial harvesting activities. It was suggested by IRDNC, based on previous experience with harvester interviews, that two participants of a similar age and gender be interviewed at the same time. This allowed participants to discuss the questions between themselves and generate richer responses. Translators were used in all four conservancies to assist with the language barrier between the researcher and the participants. Prior to the start of data collection, the translators were informed of the questions to be asked. The translators also played a vital role in locating harvesters, as Himba people are nomadic and therefore do not reside in one area for extended periods of time.

In Zimbabwe, a total of 13 interviews were conducted with resurrection bush harvesters (Annexure 3) from Ward 16 of Chivi district, all of whom were divided into groups that

represented similarities in age and gender. A translator was used to assist with the language barrier between the researcher and the participants. Some participants could speak English but felt more comfortable speaking in their home language. Annexure 1 shows the research objectives that the resurrection bush harvester interviews addressed, and the type of questions asked.

Key informant interviews

In Namibia, 11 key informant interviews were conducted with IRDNC staff, regional authorities, national authorities, Kunene Conservancies Indigenous Natural Products (KCINP) Trust members, Opuwo Processing Facility (OPF) processing staff, and private companies that had an active role in the commercialisation process of the resurrection bush (Annexure 2 and 3). In Zimbabwe, 14 key informants were interviewed. These key informants consisted of BIZ employees, private companies, local Chivi district government and national government. BIZ employees were the main key informants in Zimbabwe and therefore were able to answer to the majority of the ABS research objectives (Annexure 2). In South Africa, four key informant interviews were carried out with private companies and government departments (Annexure 3). Rahn was contacted but declined to partake in the study because they felt that much of the information requested was confidential. All key informant interviews were recorded, given that respondents gave consent prior to the start of the interview.

Observations

Observations were carried out at all of the study sites. In Namibia, resurrection bush harvesters were observed to determine how they collected the species and what they used it for, staff at the processing facility in Opuwo demonstrated how the resurrection bush is stored and processed, and a private company who sources the resurrection bush from Namibia explained how the raw material is processed using sophisticated technology. Similarly, in Zimbabwe, harvesters demonstrated how the resurrection bush is collected, packaged, and transported. Private companies also showed how they process the resurrection bush into products sold to consumers. In South Africa, private companies displayed the resurrection bush raw material and explained the processing procedures.

3.2 Data analysis

Thomas (2006) notes that much of qualitative analysis falls under a "general inductive approach", which is a systematic procedure often guided by specific research objectives. This approach is commonly used in social science research and evaluation to abstract essential features from highly detailed and complex data (Thomas, 2006; Dey, 2003). This was done by using analytical categories to describe and explain social phenomena (Pope et al., 2000). In social research, social phenomena consist of: the actions and activities of participants in a particular setting or event, their perceptions relating to a particular setting or event, their holistic involvement in or adaptation to a situation or event, the interrelationships among different parties involved in an event or situation, and the setting in which the event takes place (Bryman and Burgess, 2002). Inductive analysis therefore refers to "approaches that use detailed readings of raw data to derive concepts, themes, or a model through interpretations made from the raw data by a researcher" (Thomas, 2006: 238). Figure 13 shows the coding process in inductive analysis. The approach adopted for the analysis of this research is described below.

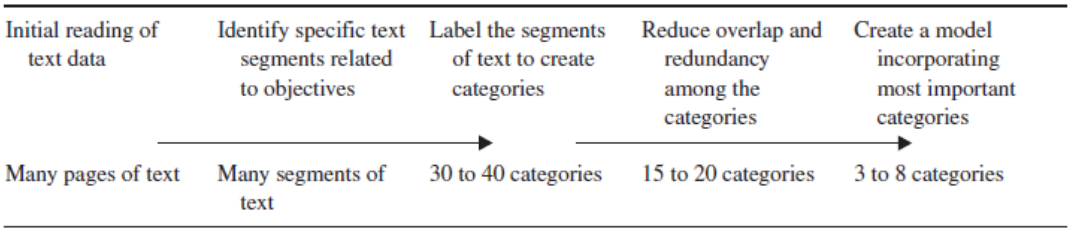


Figure 13: Coding process in inductive analysis (Thomas, 2006).

Initially, the information derived from the interviews and observational data was described and summarised. This was done electronically using MS Word and Excel. Similar questions asked during the data collection process were extracted, and the data was then studied in detail to become acquainted with the content and to identify and understand reoccurring themes, patterns, or variations (Dey, 2003; Thomas, 2006). Themes or categories which were derived from the research questions, objectives of the study, or views and experiences that were repeated by the respondents were then identified (Pope et al., 2000; Dey, 2003). This process is often referred to as "initial coding", where the data is "broken down, examined, compared, conceptualised and categorised" (Bryman and Burgess, 2002: 5). Categories were attached to words of varying sizes, phrases, sentences, or whole paragraphs relating to specific objectives (Basit, 2003). Within each category, sub-topics, quotations that captured

the essence of the category, and contradictory views and opinions were captured to further refine the data (Dey, 2003; Thomas, 2006). These categories were used as main headings when writing up the results and discussion. It is important to note that all foreign currencies (Zimbabwean Dollars, Namibian Dollars, and United States Dollars) were converted into South African Rands based on June 2018 conversion rates.

Triangulation was used to ensure the validity and reliability of the responses obtained from the semi-structured interviews. According to Olsen (2004), triangulation is defined as the mixing of data to demonstrate the diverse viewpoints and standpoints associated with a topic. Thus, triangulation is a tool for cross validation where two or more distinct methods are found to yield comparable data (Jick, 1979). Multiple triangulation methods were used to analyse the validity of harvester responses. (1) A literature review was carried out to determine the historical use of the resurrection bush, (2) interviews with key informants provided insight into the uses and harvesting methods associated with the resurrection bush, (3) visual observations of the harvesting methods and traditional uses of the resurrection bush were recorded, and (4) the similarity in answers from the harvesters proved the accuracy of participant responses. According to Denzin (2012: 82), "the combination of multiple methodological practices, empirical materials, perspectives, and observers in a single study is best understood as a strategy that adds rigor, breadth complexity, richness, and depth to any inquiry".

3.3 Ethical considerations

Ethical clearance from the Science Faculty at the University of Cape Town (UCT) was obtained (code: FSREC 41 – 2017). The NGOs involved in this research are not commercial actors and therefore have no vested interests in the commercialisation of the resurrection bush. Research permits were not needed to conduct research in Namibia because I was employed as an intern at the time. Similarly, no research permit was obtained to conduct this research in Zimbabwe because I was a partner on a research project that was being carried out at the time. Permission to work with community members was obtained from community authorities with the assistance of IRDNC, the BIZ staff, and the translators. Prior informed consent was obtained from each participant that took part in this research and confidential information provided by the subjects was protected. Anonymity was guaranteed by allocating fictitious names to all informants involved. The translators used in this research signed a

confidentiality agreement prior to the start of the research. On the completion of this research, the appropriate findings will be shared with participants in the respective countries.

3.4 Conclusion

The aim of the study was to uncover and understand the way in which benefit sharing and environmental sustainability was interpreted and implemented in the different approaches to the commercialisation of the resurrection bush. Semi-structured and key informant interviews were therefore carried out to get an in-depth understanding of the benefits received from the different commercialisation approaches and the measures adopted for environmental sustainability. In total, 137 harvesters were interviewed, and 26 key informants took part in this research. The key informants included government officials, NGOs, and private companies. The data derived from all data collection methods was analysed using coding and thematic analysis to extract common categories emerging from the findings.

4. Chapter 4 - Policy and administrative framework

4.1 Namibia

Two-thirds of Namibia's population live in rural areas and largely depend on natural resources and agriculture to sustain their livelihoods (Corbett and Jones, 2000; Schiffer, 2004; Jones and Weaver, 2009). Namibia gained independence from South Africa in 1990, however the legacy of South African racial policies and German colonial rule still prevailed (Corbett and Jones, 2000). As a result, 40,8% of land was allocated to black homelands which supported approximately 1.2 million people, and 43% was allocated to mostly white commercial farmers as freehold land supporting 4045 people (Jones and Weaver, 2009). About 13.6% of land was allocated to conservation, and a small portion of land remained unallocated (Corbett and Jones, 2000). In homeland areas, land and natural resources remained the property of the state, with traditional authorities serving as custodians (Schiffer, 2004). As a state-owned asset from which they could receive no benefits, wildlife came to be seen by local communities with hostility (Brown and Bird, 2011). Wildlife was furthermore seen as competition to livestock because it posed threats to the personal assets of local communities such as crops, livestock, and infrastructure (de Kock, 2010).

As a result of state control over natural resource management, the government faced the challenge of high poaching levels during the drought period in the 1980s, which had devastating effects on 85% of domestic livestock (Schiffer, 2004; IRDNC, 2011). In response to this, the Nature Conservation Ordinance of 1967 gave freehold land owners the right to use and manage wildlife on their farms (App et al., 2008). Wildlife populations consequently started to recover as the diversity and abundance of wildlife populations increased (App et al., 2008). In the late 1980s, the non-governmental organisation (NGO), Integrated Rural Development and Nature Conservation (IRDNC), was founded to work with rural communities to conserve wildlife (IRDNC, 2015). In 1992, the Ministry of Wildlife, Conservation and Tourism (now known as the Ministry of Environment and Tourism) developed the first draft of a policy which provided rights over wildlife and tourism for communities that formed a common property resource management institution called a "conservancy" (Figure 14) (Suich, 2010). In order for community members to qualify as members of a conservancy, they needed to be residents in that conservancy for five years. The conservancy programme has now been extended to include craft production and, more recently, the commercialisation of indigenous plant products (Suich, 2010; IRDNC, 2015). In

2001, the government approved Forest Act 12, the Community Forest Act, which allows local communities to obtain rights over forest management (Figure 14) (Brown and Bird, 2011). As a result of the implementation of these laws, IRDNC has of late promoted the harvest and sale of high-value plant resources to provide local communities with additional income to other livelihood strategies (IRDNC, 2011).

Figure 14: Conservancies and Community Forests in Namibia (NACSO, 2018)

The [DEAT] (2003: 11) explains that Community Based Natural Resource Management (CBNRM) " is about local people coming together to protect their land, water, animals and plants, so that they can use these natural resources to improve their lives and the lives of their children and grandchildren". This approach evolved as an alternative take on centralised forms of natural resource management by allowing local communities to play a much more active role in decision making regarding resource use and protection (Armitage, 2005; Shackleton et al., 2002). The Namibian CBNRM programme is therefore achieving its aim of diversifying livelihood strategies and economic activities by giving local communities access to and ownership over natural resources that they previously did not enjoy (IRDNC, 2015). Wildlife conservation aims are simultaneously being met, and the management of

high-value forestry products, too, is being enhanced (IRDNC, 2011). As a result, Namibia has become one of the most successful national examples of CBNRM (Brown and Bird, 2011).

Today, conservancies are widely recognised as one of the most leading community conservation initiatives in the world (USAID, 2008). Not only have they diversified income-generation opportunities for conservancy members, but they have supported and promoted community access to natural resources and their benefits. Of all CBNRM programmes in neighbouring countries, Zimbabwe's Communal Areas Programme for Indigenous Resource Management (CAMPFIRE) has had the largest influence on the development of Namibia's CBNRM programme (Jones and Weaver, 2009).

In 1997, Namibia became party to the Convention on Biological Diversity (CBD), and in 2014, the country became a signatory to the Nagoya Protocol (CBD, 2018). Namibia is home to a variety of plants, animals, fungi, micro-organisms, and marine organisms that makes bioprospecting attractive to companies and emphasises the need for Access and Benefit Sharing (ABS) law (MET, n.d.). Namibia has therefore been working on a draft ABS bill since 1998. This draft bill was put on hold in 2006 until international legislation on ABS was finalised (MET, n.d.). The purpose of this was to allow for the bill to be harmonised with the requirements of international legislation (Schroder and Vranckx, 2012). An Interim Bioprospecting Committee (IBPC) established by a Cabinet decision in 2007 has served to regulate and facilitate access to genetic resources in Namibia (MET, n.d.).

Namibia's ABS legislation is encapsulated in the *Access to Biological and Genetic Resources and Associated Traditional Knowledge Act No. 2 of 2017* (MET, 2017). This Act applies to biological and genetic resources found outside and inside their natural habitat; derivatives of biological and genetic resources; associated traditional knowledge; benefits arising from the use of biological and genetic resources, their derivatives and associated traditional knowledge; and the discovery or commercialisation phase of bioprospecting (MET, 2017). The regulations were released in 2018, stating that biotrade activities are excluded from the ABS regulatory requirements. The *Environmental Management Act (Act 7 of 2007)* promotes ABS through the community management of natural resources and the sharing of benefits derived from the utilisation of these resources (Schroder and Vranckx, 2012). Additionally,

the *Research, Science and Technology Act (Act 23 of 2004)* promotes, co-ordinates, and develops research, science, and technology in Namibia (NCRST, 2004).

Much of the understanding of genetic resources in Namibia is derived from the traditional knowledge of indigenous and local communities (MET, 2012). Even though the ABS legislation and regulations have only recently been adopted and implemented, a number of ABS-related agreements have already been negotiated for Namibian producers of natural resources (MET, n.d.). These include:

- Commiphora resin – between the Kunene Commiphora Conservancies Association and the South African cosmetics company, Afriplex Ltd.
- Maruline – an active ingredient in Marula, for which a patent was granted in 2006, that is co-owned by Marula growers in SADC and the French cosmetics company, Aldivia.
- Hoodia – between San Growers Associations in Southern Africa and the South African-based Council for Scientific and Industrial Research (CSIR).

Due to the increase in consumer interest in natural products and the potential of Namibian indigenous plant species to meet these demands, increasing attempts have been made over the past decade to expand the development of the indigenous natural products sector in the country (MCC, 2008). The Millennium Challenge Corporation (MCC) Namibia programme aims to "reduce poverty by increasing the competence of the Namibian workforce, and by increasing the productivity of agricultural and non-agricultural enterprises in rural areas" (MCC, 2008: 9). As a result of the implementation of the programme, a large investment of funds went into agriculture, education, and tourism projects. One of the programme's objectives was to increase the income from indigenous natural products to the poor nationwide. The goal was therefore to increase the volume, quality, and value of the natural products collected and harvested by Producer and Processor Organisations (PPOs), and to advance PPO operational and business capacity. This had the potential to benefit thousands of Namibian households involved with the harvesting, processing, and sale of indigenous natural products. Species that were selected as a priority at the time included: *Citrullus lanatus, Ximenia Americana, X. caffra*, *Sclerocarya birrea*, *Hoodia gordonii, Harpagophytum procumbens* and *H. zeyheri*. Other species that were considered to have potential for the indigenous plant products industry were: *Colophospermum mopane*, *Kigelia africana*, *Adansonia*

digitata and *Commiphora wildii*. The huge injection of funds that went into the Namibian economy to drive economic activities associated with indigenous plant species in the country could be an important activity that promoted the commercialisation of the resurrection bush.

4.2 Zimbabwe

As in Namibia, two-thirds of Zimbabwe's population rely on agricultural activities for the majority of their household income (Grundy and Le Breton, 1997). Rural populations reside on land with minimal agricultural potential, low rainfall, and poor soils (Grundy and Le Breton, 1997). Population growth amongst rural communities provides significant challenges to address poverty perpetuation and land degradation on communal land (Child, 1996). Communities have therefore become more reliant on the country's already declining resource base (Grundy and Le Breton, 1997). In the 1960's wildlife populations decreased at a rapid rate and much of the land was being converted for agricultural use (Frost and Bond, 2008). The CAMPFIRE programme was therefore initiated in the late 1980s to decentralise the management of natural resources, particularly wildlife, to local communities (Child, 1996; Grundy and Le Breton, 1997). This meant that communities received custody over and responsibility for managing wildlife resources as well as the benefits derived from their utilisation (Frost and Bond, 2008).

Each district (89) in Zimbabwe (Figure 16) has a Rural District Council (RDC) made up of elected councillors representing each ward in the district (Grundy and Le Breton, 1997). The districts comprise approximately 1958 wards, with each ward housing an average of six villages that are home to approximately 991 households per ward (Frost and Bond, 2008). The RDCs form the local government and have a degree of authority over local-level governance. As a result, RDCs are legally the owners of communal land and the associated wildlife resources that fall within their districts (Grundy and Le Breton, 1997). The accepted but non-binding agreement was that RDCs would pay 50% of safari-hunting and ecotourism revenues to communities (per ward), 35% to wildlife management (monitoring, fire control etc.), and 15% to RDCs as an administrative levy (Frost and Bond, 2008). Figure 15 shows the general structure of CAMPFIRE in Zimbabwe.

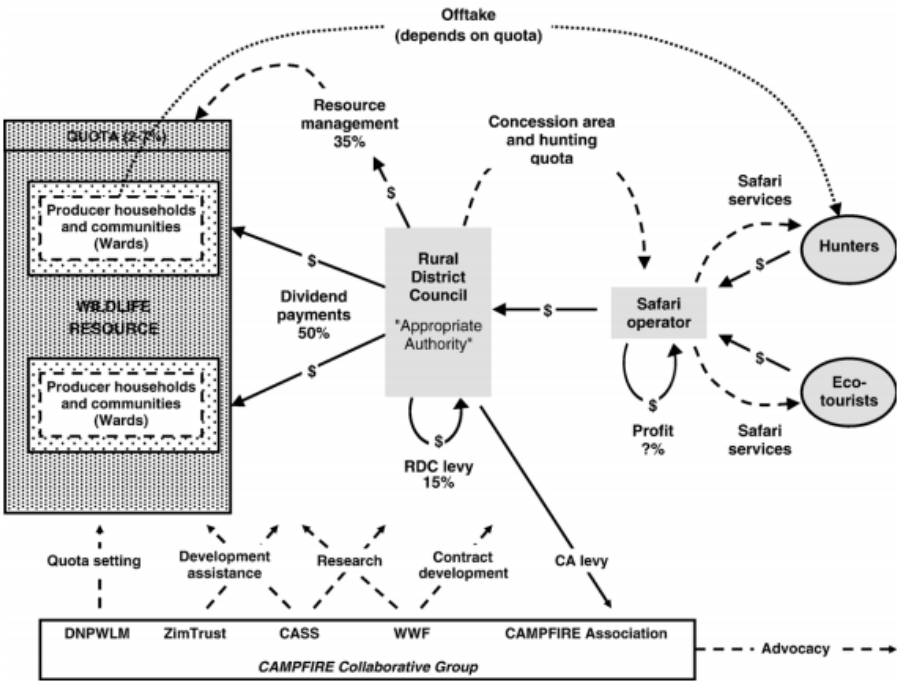


Figure 15: General structure of CAMPFIRE in Zimbabwe. Financial transfers - solid lines. Resource offtake - dotted lines. Services - dashed lines (Frost and Bond, 2008).

Because the CAMPFIRE programme is primarily focused on wildlife resources, Bio-Innovation Zimbabwe (BIZ), a non-profit organisation, works with local communities to drive research and to assist with knowledge sharing and the commercialisation of underutilised indigenous plants in Zimbabwe (BIZ, 2013). Their goal is to find, study, and develop plant species that could be used by small-scale farmers, especially in the drier parts of Zimbabwe, to generate additional cash income to other livelihood strategies (BIZ, 2013). The resurrection bush was identified as one of the top 20 underutilised species in the country in 2011. BIZ then conducted research for potential markets and began commercialising the species.

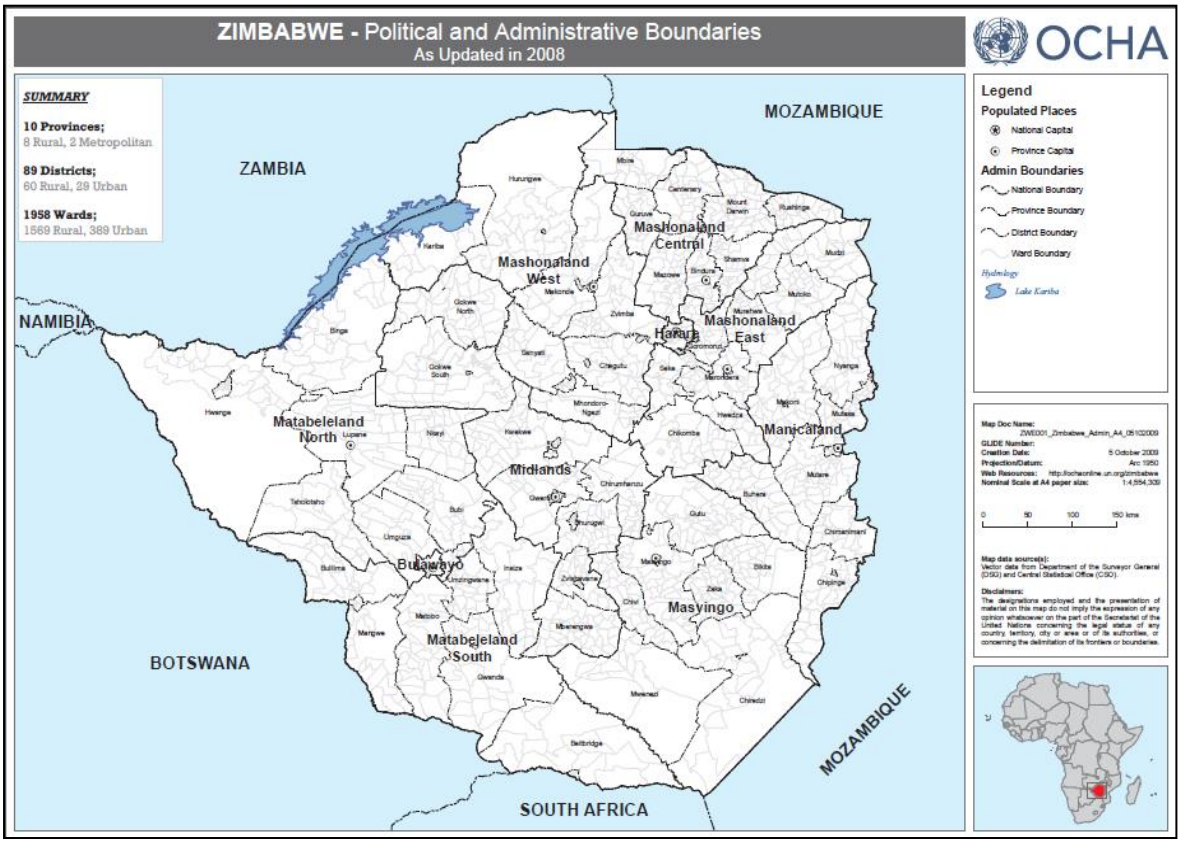


Figure 16: Provinces and districts of Zimbabwe (OCHA, 2008a).

Zimbabwe became party to the CBD in 1995 and a signatory to the Nagoya Protocol in November 2017 (CBD, 2018). There are two legal and policy instruments that relate to ABS in Zimbabwe that were implemented after ratification to the CBD. These include: the *Environmental Management Act of 2002* and the *Statutory Instrument 61 of 2009* (Access to Genetic Resources and Indigenous Genetic Resource-based Knowledge) Regulation (Chibememe et al., 2014). The *Forest Act [chapter 19:05]* specifies that those buying forest produce should obtain a harvesting permit from the Forestry Commission in the district where the resource was harvested. Section 116 and 117 of the Environmental Management Act speak specifically to the conservation of and access to biological diversity and the regulation of biological and genetic resources (EMA, 2002). Section 116 of the Environmental Management Act highlights the importance of local communities' rights over biodiversity, which should be protected and respected. Section 117 of the Environmental Management Act requires regulations that "provide for the equitable sharing of benefits arising from the technological exploitation of germplasm originating from Zimbabwe

between the owner of the technology and the Government" (Chibememe et al., 53:2014). This provision gives the impression that local communities are excluded and that benefits are only distributed between the owner of the relevant technology and the government. The *Statutory Instrument 61 of 2009* Regulation (Access to Genetic Resources and Indigenous Genetic Resource-based Knowledge) is therefore the pillar of ABS in Zimbabwe as it clearly defines community rights and explicitly emphasises the procedures involved with obtaining Prior Informed Consent (PIC). In addition, the regulations also ensure the fair and equitable distribution of benefits arising from the utilisation of genetic resources and indigenous genetic resource-based knowledge (Shumba et al., 2009; Chibememe et al., 2014). This ABS legislation focuses solely on the utilisation of genetic resources as envisioned by the CBD.

4.3 South Africa

South Africa became party to the CBD in 1996 and the Nagoya Protocol in 2014 (CBD, 2018). In 2006, Chapter 6 of the *National Environmental Management: Biodiversity Act, 10 of 2004* (NEMBA) came into force to establish rules for ABS in South Africa (RSA, 2004). Later, in 2008, the Bioprospecting, Access and Benefit Sharing (BABS) regulations were released under NEMBA. The BABS regulations stipulate that users of biological and genetic resources must obtain Prior Informed Consent (PIC) and negotiate Mutually Agreed Terms (MATs) to ensure the fair and equitable sharing of benefits derived from the commercial or non-commercial use of the resource (RSA, 2014). In 2015, amendments to BABS were published to explicitly regulate biotrade activities, stipulating the necessary requirements to obtain a biotrade permit (RSA, 2015). This goes beyond the scope of the Nagoya Protocol (PhytoTrade Africa 2015). The procedures involved in order to obtain a bioprospecting or biotrade permit are similar in that one needs proof of PIC, a signed Material Transfer Agreement (MTA), and signed Benefit Sharing Agreement (BSA).

If the necessary permits are not in place, companies or individuals are subject to a large fine or even imprisonment (RSA, 2015). The scope of the South African ABS legislation goes beyond the scope of the Nagoya Protocol. According to Wynberg (2017: 200) "the scope of the regulatory framework in South Africa is very wide, regulating all indigenous biological resources, as opposed to only genetic resources, and all phases of research, development and commercialisation". Similarly, PhytoTrade Africa (2015) expressed that the broad scope of NEMBA (which includes genetic and biological resources), creates a risk for industries to

move away from biotrade in South Africa. They argued that because of the complexity of the regulations and the time-consuming processes to be followed in order to comply, industries would source ingredients from countries where biotrade products can be accessed through simpler trade agreements (PhytoTrade Africa 2015). Illustrative of this point are the extensive concerns that have been raised about the cumbersome nature of the regulatory framework and permit approval process – in some cases taking longer than two years (Wynberg, 2017). Additional concerns relate to the Department of Environmental Affairs' lack of understanding of industry needs. Industries have faced significant challenges in getting PIC and finding communities with whom to negotiate BSAs (Wynberg, 2017). The lack of awareness among regulators about markets and different industries and the realities on the ground prove to be a central problem for South Africa (Wynberg, 2017). These are some of the many challenges associated with the regulatory framework in South Africa and the reasons why industries in South Africa are sourcing indigenous resources from outside of the country.

4.4 Conclusion

Each of the three countries included in this study have adopted national laws and implemented regulatory requirements for ABS activities. However, South Africa is the only country that has conflated regulatory requirements for both biotrade and bioprospecting activities. This has resulted in negative impacts for the country as industries are sourcing material from other provider countries (such as Namibia and Zimbabwe) where the commercialisation of natural resources occurs in a transparent and equitable manner. This has added knock-on effects for harvester communities in South Africa who rely on the commercialisation of natural resource for their daily survival.

5. Chapter 5 – Results: Traditional knowledge associated with the resurrection bush

5.1 Traditional knowledge and the historical use of the resurrection bush

Traditional knowledge is a body of knowledge that has been passed down from generation to generation within a community (WIPO, 2015). This body of knowledge is often related to local biodiversity and the various ways that it can be used. For centuries, communities across the globe have learned, used, and passed on traditional knowledge relating to biodiversity (CBD, 2010b). Today, traditional knowledge associated with biological and genetic resources is increasingly being used by industries to guide product development. As this chapter will show, the resurrection bush has traditionally been used for a variety of purposes across the sites of study. Recognising the traditional knowledge associated with such genetic resources is an important component of both the CBD and the Nagoya protocol. Understanding this knowledge furthermore provides insight regarding the commercial activities and ABS agreements linked to the resurrection bush.

5.1.1 Knowledge passed down about the resurrection bush

Of the 122 respondents interviewed in the Orupembe, Sanitatas, Otjiu-West and Otjitanda conservancies in Namibia, all but two indicated that their elders[1] taught them about the resurrection bush. A young female harvester expressed that "*Ohandukaze*[2] is part of our culture, my parents taught me about the plant" (Respondent 25d, Otjitanda conservancy, 14 October 2017). An elderly female who could not remember her age said, "The use of *Ohandukaze* is very old. When I was young, my grandparents even knew about it – it is not new" (Respondent 7a, Orupembe conservancy, 5 October 2017). The two participants who were not taught about the resurrection bush came to learn about it when they were in the field. These two 83-year-old respondents explained, "No one taught us about *Ohandukaze*. Very long ago we came across *Ohandukaze* in the bush. We pulled it out and smelt it and then started using it as perfume" (Respondent 37c and 38c, Otjiu-West conservancy, 11 October 2017).

In Zimbabwe's Chivi district, however, all 13 of the resurrection bush collectors who were interviewed were taught about the species from their parents. One male respondent said, "I

1. An elder is anyone who has reached a certain age that has had enough life experience to have something to offer those younger than them (Stiegelbauer, 1996).
2. Otjihimba name for the resurrection bush in Namibia.

learnt about it when I was much younger. I used to harvest it for my parents" (Respondent 13e, Chivi district, 10 May 2018). All of the respondents further added that their elders still use the resurrection bush traditionally to this day.

5.1.2 Customary use of the resurrection bush in the four conservancies in Namibia

Figure 17 depicts the various uses that the respondents from each of the four Namibian conservancies were taught about the resurrection bush by their elders. Two elderly respondents said that "*Ohandukaze* has a very old use for tea and perfume" (Respondents 7a and 8a, Orupembe conservancy, 5 October 2017). This was echoed by the majority of the elders, many of whom indicated that they use the resurrection bush for tea (97%) and perfume (55%). One respondent elaborated on the use of the plant for perfume, stating that "in the past the elders did not know much about other perfume plants, so they used *Ohandukaze* a lot for perfume" (Respondent 3b, Sanitatas conservancy, 7 October 2017). Twenty-two percent of elders indicated that they used the resurrection bush as goat food. This too is a practice that has been passed down from generation to generation. Two-middle aged men explained, "Our parents used *Ohandukaze* as goat food, they told us not to harvest it because it is food for the animals" (Respondents 7c and 8c, Otjiu-West conservancy, 11 October 2017). The benefit of this practice was made clear by a middle-aged female who noted that as a child, she was taught that the goats that were fed *Ohandukaze* would produce more milk (Respondent 11c, Otjiu-West conservancy, 11 October 2017).

Elders, especially from Orupembe conservancy, reported to have used the resurrection bush as a medicine to clean out the stomachs of women who had just given birth (Respondent 7a and 8a, Orupembe conservancy, 5 October 2017). *Ohandukaze* tea, an elderly man explained, is further known to help "when a woman has pain just after giving birth" (Respondent 15a, Orupembe conservancy, 5 October 2017). The tea, a middle-aged man further explained, helps to "remove the cold from the body" if the new mother is "feeling cold after giving birth" (Respondent 16a, Orupembe conservancy, 5 October 2017). It was also noted that the resurrection bush was used by elders as a medicine to treat coughing (8%), chest pain (6%), colds and flu (2%), and diarrhoea (2%). Five percent of the respondents also added that the resurrection bush was used as medicine for sheep. Four females in their twenties explained this, stating that they use *Ohandukaze* tea to prevent their sheep "from dying in summer when they are too fat" (Respondent 5b, 6b, 7b and 8b, Sanitatas conservancy, 7 October 2017). A

middle-aged woman from Sanitatas conservancy elaborated on this, explaining that "when the sheep get fat, they have a blood disease" and *Ohandukaze* is therefore used "to stop them from dying" (Respondent 17b, Sanitatas conservancy, 7 October 2017).

Particularly among the Himba women, traditional jewellery is a large component of their daily attire. The ankles are considered the most private part of their bodies and are therefore covered with iron bracelets. Four female respondents said that their elders used the resurrection bush to make the silver on their leg decorations black. One of the respondents explained that this was done by burning the resurrection bush and using the ash to rub onto their leg decorations (Respondent 26d, Otjitanda conservancy, 14 October 2017).

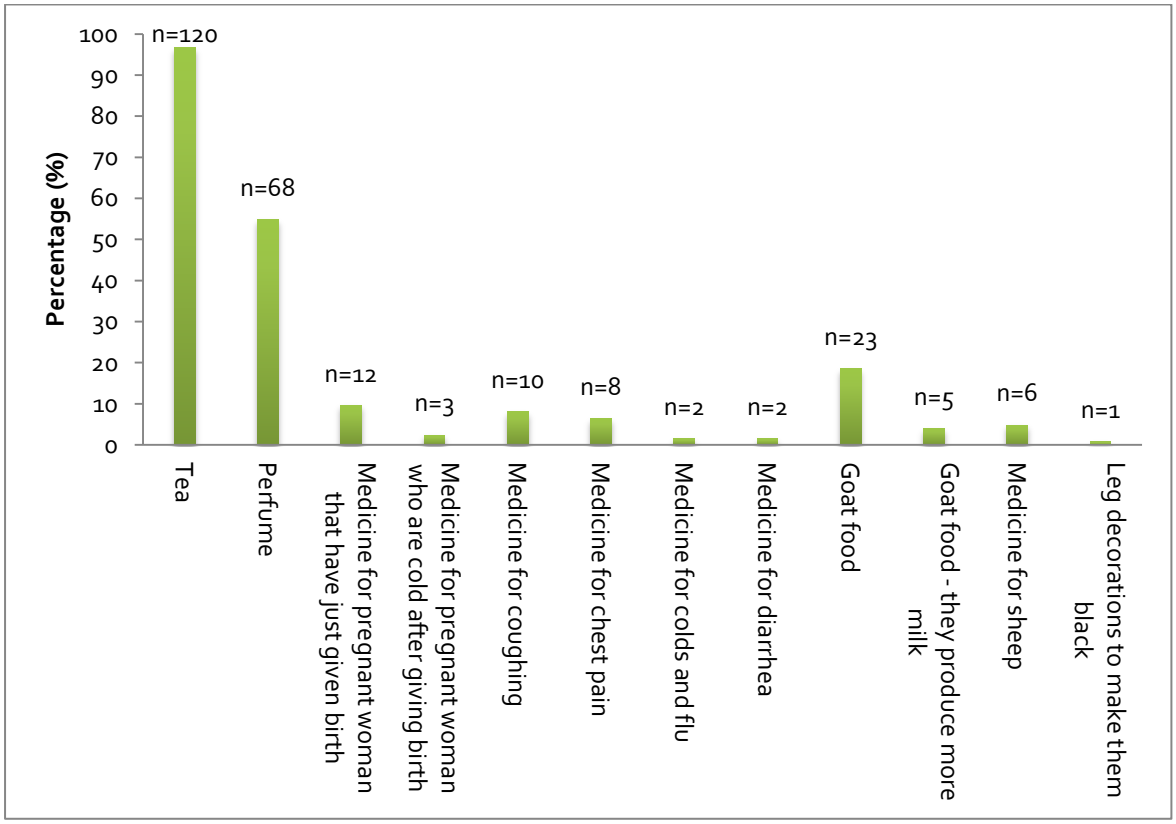


Figure 17: Elders' use of the resurrection bush in four conservancies in Namibia

5.1.3 Customary use of the resurrection bush in Chivi district, Zimbabwe

In Zimbabwe's Chivi district, all of the respondents highlighted that their parents used the resurrection bush as a broom to sweep their homesteads. Eighty-five percent of the harvesters

said that their parents drank it as a tea for flu. Two elderly female harvesters said: "When someone is not feeling well, our parents used to boil *Mufandichimuka*[3] and give it to the sick person to drink" (Respondents 10 & 11e, Chivi district, 10 May 2018). One respondent mentioned that the resurrection bush was used by their parents as a painkiller. Four female harvesters also said that "when a person had an evil spirit attached to them, an inhaler was used to chase away evil spirits" (Respondents 1, 2, 3 & 4e, Chivi district, 10 May 2018).

5.1.4 Harvesters' use of the resurrection bush in the four conservancies in Namibia

Ninety-five percent of resurrection bush harvesters in Orupembe, Sanitatas, Otjiu-West and Otjitanda said that they harvested the resurrection bush for their personal use. The remaining five percent did not harvest the species for personal consumption. Figure 18 illustrates the number and percentage of harvesters who use the resurrection bush in various ways. A young female said, "I do not use it as a perfume like my mother does, I am only selling it" (Respondent 9a, Orupembe conservancy, 5 October 2017). A group of elderly men who do not harvest the resurrection bush said: "We tell the young children not to harvest it at all because there is a buyer who wants it and that will bring us benefits in the future" (Respondent 2, 3, 4 & 5d, Otjitanda conservancy, 14 October 2017).

Many of the respondents, however, still adopt the traditional uses for the resurrection bush, as taught to them by their elders. Newer, additional uses mentioned included using the resurrection bush as a medicine for stomach pain (1%), inhaling the smoke to help with breathing problems (2%), and easing menstruation pain (2%). It is also fed to goats if they are coughing (2%). Furthermore, a powder form of the plant is mixed with cattle fat to stop hair from itching (1%), to promote hair growth (2%), and to add a pleasant fragrance to one's hair (4%). A further use for the resurrection bush was documented by a middle-aged female respondent, who said: "As a sign of respect at a wedding, I mix *Ohandukaze* tea with normal tea and give it to the married couple" (Respondent 29a, Orupembe conservancy, 5 October 2017).

The majority of respondents (61%) from the four conservancies in Namibia said they did not know of any other uses for the resurrection bush. However, the remaining that did know of

3. Shona name for the resurrection bush in Zimbabwe.

additional uses stated that the resurrection bush provided additional income (2%), medicine for coughing (6%), and cosmetic uses for buyers (4%). One percent of the respondents indicated that the resurrection bush was used in baptism ceremonies. As a male respondent in his late twenties explained:

> The pastor at the local church uses it on people who are getting baptised – they put Ohandukaze in water with other plants and then wash you with that water. It is to take the bad things away from you and bring you to God's side (Respondent 33a, Orupembe conservancy, 5 October 2017).

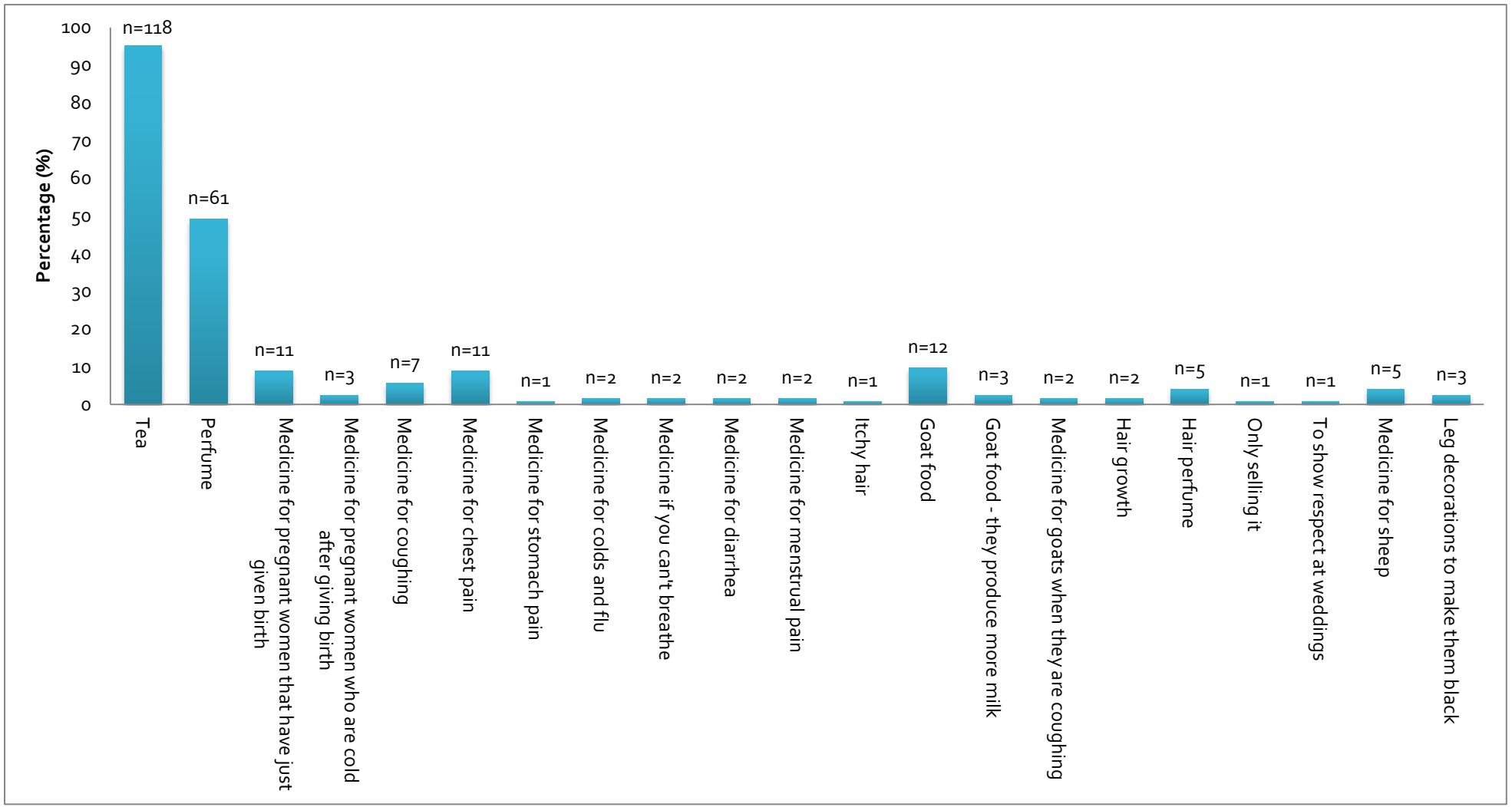


Figure 18: Harvesters' use of the resurrection bush in four conservancies in Namibia

5.1.5 Harvesters' use of the resurrection bush in Chivi district, Zimbabwe

In Chivi district, all of the respondents except one said that they used the resurrection bush for personal use. Seventy-seven percent said that they used *Mufandichimuka* as a tea to treat flu. Sixty-two percent mentioned that they still used the resurrection bush as a broom to sweep their households. One male respondent who no longer uses the resurrection bush said:

> I used to use the *Mufandichimuka* as a painkiller but now I have very strong religious beliefs and don't use it anymore. The church I go to told me that I don't need anything to heal me, I can be healed by worshipping God (Respondent 13e, Chivi district, 10 May 2018).

When the harvesters were asked if they had any other knowledge of uses for the species, five middle-aged female respondents said, "when our children are not feeling well, we bath them in *Mufandichimuka"* (Respondents 5, 6, 7, 8 & 9e, Chivi district, 10 May 2018). The remaining sixty-two percent did not know of any other uses for the species other than what they had been taught by their parents.

5.1.6 Conclusion

In Namibia, the Himba have a very rich body of knowledge linked to the traditional uses for the resurrection bush. This could be attributed to the fact that the Himba still continue to live very traditional lifestyles. The majority of the harvesters reside far from major roads, cities and towns and therefore rely predominantly on the natural environment to meet their needs. Shona harvesters in Zimbabwe's Chivi district, however, had fewer traditional practices associated with the resurrection bush. Even though Chivi district is located in a remote area, the establishment of shops, bed and breakfasts, and brick houses suggests that the area is increasingly developing. A tar road very close to Chivi district also provides easier access to major cities and towns.

Chapter 7 elaborates on the commercial activities linked to the resurrection bush, including those that utilized traditional knowledge to guide product development. The benefit sharing agreements for the use of genetic resources and or associated traditional knowledge are also discussed. The following chapter however introduces the actors involved in the different approaches to the commercialisation of the resurrection bush and their role.

6. Chapter 6 – Results: The actors involved in the different approaches to the commercialisation of the resurrection bush and the processes they follow

A variety of actors take part in the commercial activities associated with the resurrection bush, each filling a unique and specialised role. This section provides an introduction to each of the role players and the relationships between them.

6.1 Harvesters and traditional knowledge holders

In three conservancies in Namibia (Orupembe, Sanitatas and Otjitanda), all of the harvesters were Himba. This compared to Otjiu-West, where 74% of the participants were Herero. Both groups follow traditional lifestyles and are largely dependent on livestock farming for their survival (Galloway, 2014). As a result, unemployment is rife, with approximately half of Namibia's population unemployed (CIA, 2018). Similarly, in Chivi district, Zimbabwe, the majority of the district is occupied by subsistence farmers. Approximately 58% of households in the district live below the poverty line and therefore concentrate on agricultural practices to enhance food security (Chiripanhura, 2010). Unemployment is a major concern in the district, where residents mainly take part in informal trade or casual labour and rely on remittances for income (FAO, 2013).

Table 3 provides an overview of the demographic information of the resurrection bush harvesters in Orupembe, Sanitatas, Otjiu-West and Otjitanda conservancies in Namibia and Chivi district in Zimbabwe. In both countries, community-based natural resource management (CBNRM) initiatives have aided with poverty alleviation in rural areas.

Table 3: Demographic information of harvesters interviewed in Namibia and Zimbabwe

	Namibia			Zimbabwe		
Total number of harvesters	124			13		
Gender	Female: 81	Male: 43		Female: 12	Male: 1	
Average age	36			50		
Average number of children per female	4			5		
Marital status	Single: 42%	Married: 58%	Widowed: N/A	Single: 8%	Married: 69%	Widowed: 23%

6.2 Service organisations

6.2.1 Non-Governmental Organisations (NGOs)

There are a range of NGOs involved in commercialising the resurrection bush. In Namibia, Integrated Rural Development and Nature Conservation (IRDNC) – who relies solely on donor funding – plays a pivotal role in the commercialisation process of indigenous plant products in the country. Their role entails:

> Conducting resource inventories, determining sustainable harvesting methods, facilitating harvester training, monitoring buying point managers and their sales, providing technical support to the development of value chains and developing relationships between conservancies and commercial partners (KI 1, 5 October 2017, Namibia).

IRDNC is therefore the interface between the resurrection bush harvesters and the commercial actors who are interested in buying indigenous natural products from Namibia.

In Zimbabwe, Bio-Innovation Zimbabwe (BIZ) plays a similar role. BIZ is a research trust, funded by international donors, that focuses on the research and development of products and markets for underutilised indigenous species in Zimbabwe (KI 6, 14 May 2018, Zimbabwe). Their main role is to:

> Carry out resource inventories, provide harvesters with training, check raw material against quality specifications and liaise with resurrection bush harvesters and buyers in terms of prices (KI 7, 11 May 2018, Zimbabwe).

In South Africa, no NGOs are known to be involved in supporting the commercialisation of the resurrection bush.

6.2.2 Community legal representation

Nakamhela Attorneys is a legal firm based in Namibia which concentrates on rural development in the country. The business represents community-based organisations when reviewing or drafting contracts relating to ABS or joint venture agreements. Nakamhela Attorneys has also been involved in drafting the national ABS legislation for Namibia.

6.3 Community organisations and harvesting procedures

The main reason for the involvement of NGOs is to aid local communities in diversifying their livelihood strategies and in earning additional income. The Kunene Conservancies Indigenous Natural Products (KCINP) Trust was established in Namibia in 2012 to form a legal framework for sharing the benefits derived from the Opuwo Processing Facility (OPF) and to facilitate the collective marketing of indigenous natural products. The KCINP Trust owns OPF and represents any Kunene conservancy trading in indigenous natural products. The five conservancies who hold the traditional knowledge associated with *Commiphora wildii* (Puros, Orupembe, Marienfluss, Sanitatas and Okondjombo) were made its trustees. Representatives from the five conservancies make decisions regarding commercial activities and associated agreements. Two additional trustees on the board provide technical, marketing, and logistical support. Any registered Kunene conservancy is part of the Trust given that they are involved in commercial harvesting activities and provide OPF with raw material (KI 1, 5 October 2017, Namibia). Eleven conservancies, including Otjiu-West and Otjitanda, have traded raw material through the Trust.

6.3.1 Harvesting methods employed by harvesters

During May and June, the resurrection bush is collected in white bags and transported to an appointed buying point manager in each conservancy. The bags are then weighed, and the buying point managers pay the harvesters for each kilogram of the raw material collected. The buying point manager labels each bag with the name of the conservancy, the date that the material was harvested, the bag number, and the weight in kilograms. The funds allocated to each conservancy for raw material is dependent on the demand for raw material and the availability of funds in the revolving fund. The revolving fund consists of donor funding which is managed by IRDNC to allow harvesters to get paid upfront for the raw material they collect. These funds used to pay harvesters are then reimbursed into the revolving fund when the raw material is sold to commercial actors. Restrictions are placed on how much resurrection bush each harvester can collect per season. These restrictions are in place to ensure that all resurrection bush harvesters get an equal chance to sell raw material (KI 1, 5 October 2017, Namibia). The funds to purchase the raw material are delivered to each buying point manager every two weeks by an IRDNC employee. During this time, records of resurrection bush sales are checked, and any raw material that is available for collection at the time is transported to OPF for sorting, processing, and storage. Once commercial orders have

been placed, the raw material is transported to Windhoek, where it is exported to the joint venture partner who processes the raw material and produces the final product.

In Zimbabwe, harvesters in Chivi district have organised themselves and developed an association called Marula Zimbabwe. BIZ has been buying marula kernels from the group for many years and in 2012, the harvesters received training for the commercial harvesting of the resurrection bush (KI 8, 14 May 2018, Zimbabwe). The chairperson of Marula Zimbabwe, nominated by the association in Chivi district, is contacted by BIZ when orders are placed. The chairperson informs the harvester group of how much raw material must be harvested, what specifications are required, and the time period in which the material is needed (KI 6, 14 May 2018, Zimbabwe). The harvested resurrection bush is collected in large white bags which are weighed (Figure 19). The weight is then recorded on a piece of paper with the harvester's name and the location of where the material was harvested (KI 6, 14 May 2018, Zimbabwe). The piece of paper is then placed inside the bag with the raw material and is sent to Harare (the capital of Zimbabwe) by public transport (usually buses). The bags are then collected by BIZ from the main bus stop in Harare and are weighed. The harvesters are paid individually in EcoCash (a mobile payment service) based on the weight of the raw material. If more than 10 harvesters have collected raw material, BIZ pays the chairperson for all of the raw material and the chairperson then distributes this to each of the collectors accordingly (KI 6, 14 May 2018, Zimbabwe).

Figure 19: Weighing of the resurrection bush collected by a harvester in Chivi district, Zimbabwe. Photograph: Michelle Nott, 10 May 2018, Chivi district, Zimbabwe.

In other areas of Zimbabwe, communities have developed associations and are also involved in the harvesting of the resurrection bush. In Nyanga, for example, an association has been formed, called the Indigenous Tea Company Zimbabwe (ITCZ). According to a key informant:

> The association comprises of over 300 members from the three villages in the area. The association leaders were elected from the three villages and consist of a chairman, secretary, treasurer and three committee members. The association has a central storage centre where all raw material is delivered by harvesters and sold to private companies or consumers (KI 21, 18 June 2018, Zimbabwe).

The ITCZ distributes the funds to harvesters based on the amount of raw material sold.

The establishment of community organisations or associations therefore provides an effective approach to consulting with harvesters and developing necessary agreements. It also makes it easier for companies to negotiate and remunerate harvesters for the raw material. On the contrary, in other areas such as Domboshava, where associations have not been established, the harvesting of the resurrection bush takes place independently by collectors. These harvesters are paid directly via EcoCash for the raw material that they collect (KI 21, 18 June 2018, Zimbabwe). Organisations and companies, however, favour working with communities who have organised themselves because they are easier to work with and have already set up

equitable structures to facilitate the commercialisation of natural resources (KI 6, 14 May 2018, Zimbabwe).

6.4 Intermediary services

6.4.1 Supplier of raw material

Muthi Futhi is a 100% black-owned cultivation business which began trading in 2010. The company specialises in the cultivation, harvesting, and primary processing of African medicinal plants. The cultivation site is located on the banks of the Tugela River in Kwa-Zulu Natal (KZN), with an office situated in Durban, South Africa. The company does not cultivate the resurrection bush but sources it from harvesters at the Mona market. Muthi Futhi has obtained a biotrading permit for approximately 80 species, including the resurrection bush. The company began commercialising the resurrection bush when a traditional medicine manufacturer requested the raw material. Muthi Futhi, however, has not entered into any ABS agreements for the raw resurrection bush material that they sell. According to a respondent, "Muthi Futhi is viewed as a traditional knowledge holder and therefore it is not required by the DEA to enter into ABS agreements with associated suppliers" (KI 22, 18 June 2018, South Africa).

Company A, who asked to remain anonymous, is situated in Pretoria, South Africa, and was established in 2013 as an affiliate to a Swiss company (KI 23, 14 September 2017, South Africa). The company started propagating the resurrection bush to ensure a sustainable supply of the species. According to a company respondent, "To my knowledge, I am the only company able to propagate the resurrection bush commercially" (KI 23, 14 September 2017, South Africa). The company supplies raw material and raw material products mainly to overseas clients and has obtained a biotrade permit from the DEA in order to do so.

KAZA Natural Oils is a small company located in Zimbabwe that specialises in the production of lipid oils extracted from indigenous plant species in the KAZA (Kavango – Zambezi) region. The company was established in 2016 and is currently looking at extraction methodologies for a variety of plant species. An internationally renowned skincare company was the driving motivation behind developing a resurrection bush extract. KAZA Natural Oils has therefore partnered with a company in the United Kingdom (UK) to manufacture an extract from the species. KAZA Natural Oils supplies the raw material to the UK company

which has the necessary equipment to formulate an extract. Although KAZA Natural Oils has not historically engaged in any benefit-sharing arrangements associated with the resurrection bush, arrangements are currently being put in place since Zimbabwe is now a signatory to the Nagoya Protocol.

6.5 Processing company

Opuwo Processing Facility (OPF), located in northern Namibia, is a community-owned business that specialises in sourcing plant material and producing steam distilled essential oils (Figure 31). The purpose of its establishment was to "add value in Namibia through the extraction and sale of essential oils and raw plant material to increase returns for harvesters" (KI 1, IRDNC, 5 October 2017, Namibia). The company extracts and sells essential oils from *Colophospermum mopane* and *Commiphora wildii* and markets raw material from *Sarcocaulon mossamendes, Commiphora tenuipetiolata,* and *Myrothamnus flabellifolius*. All raw material collected by harvesters is sorted and stored at the facility until orders are placed. The raw material is then sent to Windhoek and exported to the consumer. Currently, OPF is experimenting with developing an essential oil from the resurrection bush. The raw material is put into a steam still (Figure 20) for approximately an hour and 30 minutes and the oil is collected in large glass bottles while the boiler machine is running. The oil is filtered (Figure 21) and packaged into small glass bottles which are labelled with the date the material was processed, the name of the conservancy where the raw material came from, and a bottle number. The bottles are then transported to Windhoek where they are stored and distributed as samples.

Figure 20: Steam distillation equipment used to make an essential oil in Opuwo. Photograph: Michelle Nott, 2 October 2017, Opuwo, Namibia.

Figure 21: Filtering of the resurrection bush essential oil. Photograph: Michelle Nott, 2 October 2017, Opuwo, Namibia.

6.6 Retail companies

6.6.1 Kombucha

Thrive Zimbabwe is a small company which was established in 2016. The company specialises in fermented food products, and more recently, in fermented beverages such as kombuchas (fermented teas). The company came across the resurrection bush tea sold in Zimbabwe and decided to make a kombucha with the species. Simple technologies and machinery are used, and the products are only sold locally in Zimbabwe. Thrive Zimbabwe is not aware of ABS or the national requirements associated with it. Therefore, no benefit-sharing agreements have been developed for their commercial use of the resurrection bush.

6.6.2 Herbal pharmaceuticals

Wild Health is a small company located in Zimbabwe that specialises in developing pharmaceuticals from indigenous plant species. The company was founded in 2016 and uses very simplified technologies to formulate their products. The company was introduced to the resurrection bush when a doctor recommended it to a cancer patient for its antioxidant and cancer treatment properties (KI 21, 18 June 2018, Zimbabwe). Wild Health has not entered into any ABS agreements and has limited knowledge on ABS regulatory requirements in Zimbabwe.

6.6.3 Herbal essential oils

African Apothecary, a small company situated in Zimbabwe, specialises in producing natural aromatherapy remedies and body care products using essential oils and indigenous ingredients that are handcrafted and contain no chemicals. The company has expressed an interest in developing an essential oil from the resurrection bush once their steam still is operational. The company also sells resurrection bush capsules locally. These capsules are produced by Wild Health.

6.6.4 Food ingredients

Speciality Foods of Africa is based in Zimbabwe and was established in 2002. This company specialises in "commercialising products from underutilised plants found in southern Africa" (KI 20, 7 May 2018, Zimbabwe). The company's products range from jams and herbal teas to food supplements or ingredients (cosmetic or medicinal). The company has developed a resurrection bush tea called "Tulimara", which has been sold locally for many years. Speciality Foods of Africa has not developed any ABS agreements with harvesters who supply them with raw material.

6.6.5 Cosmetics

A large, internationally renowned cosmetics company, who asked to remain anonymous, was founded in 1976 and has stores in 66 countries. The company specialises in cosmetics, skincare, and perfumes. The founders of the company were inspired by cultural and traditional forms of health and body care and therefore sell products that are made from natural, ethically and sustainably sourced ingredients. Some of these natural ingredients include: Brazil nut oil, sesame seed oil, honey, and shea butter. They also have an extensive range of natural ingredients sourced from a diversity of plants. Expensive laboratory equipment is used to test the ingredients and products by skilled and qualified staff. The company has recently expressed interest in using an extract of the resurrection bush in their products. Contact was made with the company for comment on their compliance to ABS and the Nagoya Protocol, however no response was received.

6.7 Research and Development

Intiki, situated in the South African province of Kwa-Zulu Natal (KZN), was founded in 2000 following research conducted on the cosmetic uses for the African Sausage tree (*Kigelia Africana*) Since then, a wide variety of African plants have been studied and developed into different skin care products. Between 2010 and 2014, Intiki did experimental work on *Commiphora tenuipetiolata* gum sourced from OPF in Namibia. The company later showed interest in working with the resurrection bush (KI 1, IRDNC, 5 October 2017, Namibia). As a result, a joint venture ABS agreement was developed with the Kunene Conservancies Indigenous Natural Products (KCINP) Trust in 2017 to use *Myrothamnus flabellifoilia* and *Commiphora tenuipetiolata*. The company mainly sources raw material from outside South Africa and has the necessary agreements in place for ABS in provider countries. This is due to the cumbersome nature of the ABS regulatory requirements currently in South Africa. For species that can only be sourced from within South Africa, however, the company has obtained a bioprospecting permit.

Parceval is a pharmaceutical company situated in the Western Cape of South Africa and was established over 25 years ago. It is deeply entrenched in the herbal medicine sector and specialises in cultivating and sourcing raw botanical materials, establishing supply chains, and formulating and manufacturing intermediary and finished products. Parceval has a sophisticated production facility where high technology machinery is used to develop herbal

ingredients. In 2017, Parceval received joint funding with BIZ. This funding was obtained through the Southern Africa Network for Biosciences (SANBio) from the Finnish/South African partnership, BIOFASA II. The funding was granted to develop local markets for resurrection bush tea or tea blends containing the resurrection bush in Zimbabwe (KI 6, 14 May 2018, Zimbabwe). The company deals with a large variety of natural resources and as a result, has previously obtained a bioprospecting permit in South Africa for approximately 30 different species. Parceval has ABS agreements in place for all of the species it works with and is working together with BIZ to obtain ABS compliance for their use of the resurrection bush sourced from Zimbabwe.

Ginny Fowl Gin was founded in 2017 and is situated in the Western Cape, South Africa. The company specialises in producing gins with different flavours, infused with botanicals. Ginny Fowl Gin said:

> After much experimentation, we have used the resurrection bush very successfully, both after blooming and in dry form. Alcohol is an excellent extractor of essential oils. The resurrection bush has a lovely piney flavour that compliments the juniper in gin (KI 25, 25 April 2018, South Africa).

Zuplex is situated in KZN and was established in 2015. The company specialises in adding value to unique and established botanicals by using innovative technologies to manufacture standardised botanical extracts. Although Zuplex's main focus lies on developing cosmetic extracts for international clients, the company has begun researching and developing products for nutrition, flavour, fragrance and complementary health sectors (KI 22, 18 June 2018, South Africa). Zuplex has only recently started developing a resurrection bush extract for skin hydration purposes. The company is currently in the process of obtaining a bioprospecting permit but in the interim, has entered into an ABS agreement with the National Khoi and San Council (NKSC) for traditional knowledge associated with buchu, rooibos, hoodia, sceletium, the resurrection bush, and devil's claw.

Company B, founded in 1940, is based in Switzerland with subsidiaries all over the world. In 1965, the company established a cosmetics division which recognises the potential of nature, combining it with modern technology. The company developed a resurrection bush extract called Myramaze® and advertises on their website that they are compliant with the Nagoya Protocol. This company, however, declined to participate in this study and therefore further

information could not be obtained. The only information that the company was willing to share was that "Company B markets an extract of the resurrection bush to customers which are manufactures of cosmetic products" (KI 24, 3 October 2017, South Africa).

6.8 Researchers

The resurrection bush (*Myrothamnus flabellifolius*) is also used in research to understand desiccation tolerance in resurrection plants. Much of this work is that of an academic staff member in the Molecular and Cell Biology Department at the University of Cape Town (UCT). For many years, the department has been studying the potential of resurrection plants to withstand extreme drought conditions. Their interest in this research lies in the potential to introduce characteristics of the resurrection plants into crops, thereby improving their tolerance to drought and ultimately working to ensure food security in the face of climate change. The researchers also provide scientific advice to various companies. This includes advice regarding the toxicology of resurrection bush tea, which requires determining if there are any chemicals in the leaves of the species that are harmful to humans. The raw material used by the department for research purposes is mainly sourced from the Waterberg area in South Africa. There are permit requirements which stipulate how many kilograms can be harvested and at what times of the year this can take place. But once the material is in the laboratories at UCT, there are no restrictions on what can be done with the raw material for research purposes. This is because research conducted in South Africa that is not used for commercial purposes is excluded from the scope of the ABS legislation (RSA, 2004). In other words, pure scientific research conducted by a company or researcher is not subject to requirements of the ABS framework. UCT therefore does not need a bioprospecting permit from the Department of Environmental Affairs (DEA). According to the DEA (2012), the minister needs to be notified of research associated with indigenous biological resources and be informed if the intent of the research changes to serve commercial purposes. Therefore, a bioprospecting permit will need to be obtained if a patent is applied for or if the intellectual property is transferred as a result of the initial research.

6.9 Government

6.9.1 National Government

6.9.1.1 Namibia

In Namibia, the national Ministry of Environment and Tourism (MET), the National Botanical Research Institute (NBRI), and the Ministry of Agriculture, Water and Forestry (MAWF) are responsible for natural resource management and use in the country. The main roles of the MET are to promote the conservation of biodiversity through the sustainable utilisation of natural resources and to develop tourism for the maximum social and economic benefit of Namibian citizens. The MET's tasks involve the issuing of research permits, attending to regulation issues associated with natural resources, representing Namibia at international conventions and meetings, and raising awareness around environmental concerns and laws. The National Commission on Research, Science and Technology (NCRST) are responsible for receiving all bioprospecting permit applications and sending them to the relevant organisations (such as the Interim Bioprospecting Committee [IBPC] or the MET) for comment. The Interim Bioprospecting Committee (IBPC) consists of seven individuals from different national government departments who meet regularly to discuss research applications that deal with bioprospecting activities (KI 3, 19 October 2017, Namibia). The applications are assessed, and recommendations are sent to the line ministries, who then provide the terms and conditions for approval or grounds for disapproval. The IBPC then has the final say whether an application is successful or not. Currently, if an application is successful, a research and collection permit which allows the research to be carried out on the specified indigenous plant/s and for samples to be harvested from the wild, is required. If any genetic material is sent out of the country, a Material Transfer Agreement (MTA), phytosanitary certificate, and export permit are required from the Ministry of Agriculture (KI 1, 5 October 2017, Namibia).

The NBRI is a subdivision within the Directorate of Agricultural Research and Training (DART) of the MAWF of the Government of the Republic of Namibia. The role of the NBRI is to:

> Help facilitate and coordinate opportunities around indigenous plants – largely commercial opportunities – with an aim to provide a diversification of income-generating activities in rural areas (KI 5, 20 October 2017, Namibia).

Other tasks of the NBRI include reviewing research requests that are primarily associated with plants and controlling the use of plants in research. The NBRI is also currently involved with managing the processes and procedures around MTAs and Mutually Agreed Terms (MATs).

6.9.1.2 Zimbabwe

In Zimbabwe, the Ministry of Environment (MoE), the Environmental Management Agency (EMA), the Ministry of Agriculture, and the Forestry Commission are the main national government departments that deal with natural resources. The role of the MoE is: to promote conservation and the sustainable use of natural resources; to promote education, training, and awareness about environmental and natural resource conservation; to review natural resource legislation; to provide policy guidance; and to monitor the implementation of national programmes. Similarly, the EMA's main task is to ensure the sustainable use and protection of Zimbabwe's environmental goods and services. The Forestry Commission's main responsibilities are to "manage staff in Forestry extension offices and regulate forestry programmes in Zimbabwe" (KI 11, 13 May 2018, Zimbabwe). Lastly, the Ministry of Agriculture is responsible for issuing export permits and phytosanitary certificates for raw material exported outside of the country (KI 6, 14 May 2018, Zimbabwe).

6.9.1.3 South Africa

In South Africa, the national Department of Environmental Affairs (DEA) is responsible for the regulation and management of all biodiversity and conservation matters to facilitate economic growth and development. The DEA acts as a national focal point for ABS in the country. Therefore, all activities involved in the bioprospecting of indigenous biological resources and/or associated traditional knowledge require a bioprospecting permit from the department. If any raw material is exported for bioprospecting or research purposes, a bioprospecting permit is mandatory. At a provincial level, nature conservation departments manage harvesting permits for the use and conservation of biological resources. An export permit is required from the Member of the Executive Council (MEC) of a province should any raw material be exported for non-commercial research purposes.

6.9.2 Regional government

In the Kunene region of Namibia, the Directorate of Forestry is the main local department that deals with communities and the harvesting of natural resources. It is the Directorate of Forestry's responsibility to:

> Provide communities in communal areas with information about how to take care of natural resources, how to harvest them correctly, the permit procedures involved with marketing a forest product and creating awareness on how to control fire outbreaks (KI 15, 3 October 2017, Namibia).

Because all of the study sites in Namibia are already gazetted as community forests, or are in the process of doing so, they can harvest the resurrection bush and sell it commercially as they already have rules and regulations in place to do so. Therefore, the Directorate of Forestry does not play a large role in the commercialisation of the species in the region. It is, however, responsible for ensuring compliance with regard to the regulations of the community forests.

6.9.3 Local government

In Chivi district in Zimbabwe, a variety of local government officials are involved with the commercialisation of the resurrection bush. The Chivi district Chief Executive Officer (CEO) is entitled to manage all affairs in the district, whereas the District Administrator (DA) is responsible for coordinating all development activities that take place within the district. As a result, the CEO and DA need to be informed of any commercial activities associated with indigenous species in the district, and permission must be obtained before harvesting for commercial purposes can commence. The CEO and DA are also responsible for informing the communities within the district about commercial harvesting activities and linking buyers (currently BIZ) with harvesters. The local Forestry Commission is responsible for issuing harvesting permits for commercialisation, training communities on how to harvest natural resources sustainably, monitoring the use of natural resources, and enforcing sanctions for non-compliance.

6.10 Conclusion

It is evident that a wide variety of actors are involved in the commercialisation of the resurrection bush. Particularly for commercialisation activities that have a research and development component, government officials and service organisations are largely involved in providing the necessary support to facilitate the commercialisation process. National government are mainly involved with the conservation of natural resources in the country (reviewing bioprospecting application forms and issuing permits), whereas regional and local government and NGOs fulfil many of the duties on the ground. These activities include providing collectors with training on how to harvest the resurrection bush, assisting

communities to develop organisations or associations, facilitating commercial transactions between buyers and harvesters, and ensuring that communities are not exploited by means of the illegal harvesting of natural resources. The next chapter will discuss the different commercialisation approaches associated with the resurrection bush and describe the processes that each one follows.

7. Chapter 7 – Results: Commercialisation approaches associated with the resurrection bush

There are a variety of different ways the resurrection bush can be commercialised. These approaches include: informal trade, biotrade, and bioprospecting. Informal traders form part of the informal economy, which often involves unregulated commercialisation activities. Biotrade commercialisation approaches, however, are more organised, involving larger volumes of raw material and formal agreements. Bioprospecting commercialisation approaches entail high-level research and development activities that require formal agreements and negotiations with harvesters.

7.1 Informal trade

Based on extensive research, to my knowledge, the informal trade of the resurrection bush takes place mainly in Opuwo, Namibia and at informal markets in Kwa-Zulu Natal, South Africa. Informal trade activities are largely unregulated and require limited capacity and capital to maintain. As a result, the amount of resurrection bush that has been harvested and the methods employed to do so are unknown. Figure 24 depicts the value chain of informal trade activities associated with the resurrection bush.

7.1.1 Local trade in Namibia

In Opuwo, local women collect and sell a variety of different indigenous plant products harvested from surrounding areas where the plants are found. These markets are very informal; the women usually sit along the roadside and sell to local people in the area. The majority of the plants are aromatic and are sold as traditional perfumes. Some traders have tubs of mixed plant material that is ground into a perfume and sold pre-mixed. Alternatively,

buyers can choose which plant material they prefer and formulate their own perfume. Figure 22 shows the different indigenous plant products and a tub of pre-mixed perfume.

Figure 22: Harvested indigenous plant products and pre-mixed perfume (bottom left). Photograph: Michelle Nott, 16 October 2017, Opuwo, Namibia.

With the exception of one young female selling crafts, none of the street traders in Opuwo sold the resurrection bush because it is not commonly found in the area or close by. The aforementioned young female trader had a 20-kilogram maize meal bag which was full of the resurrection bush (Figure 23). She stated, however, that she only sold it to those who specifically requested it. A large portion of residents in Opuwo are Himba and therefore still carry out their traditional practices. The majority of residents therefore buy indigenous plant material from local traders who source these from nearby. This form of trade occurs on a small scale and requires minimal capacity and capital to run. No processing of the species takes place as the raw material is sold in the same form as it is harvested. Because Opuwo is also a tourist destination, small quantities of indigenous plants are also sold to travellers.

Figure 23: Local woman trading crafts and the resurrection bush in Opuwo. Photograph: Michelle Nott, 16 October 2017, Opuwo, Namibia.

In Zimbabwe, there is reportedly no informal trade of the resurrection bush. According to a middle-aged female resurrection bush harvester, "the resurrection bush is found everywhere in Zimbabwe so whoever wants it can go and harvest it for themselves" (Respondents 1e, 10 May 2018, Zimbabwe).

7.1.2 Informal trade, Kwa-Zulu Natal, South Africa

The Muthi Futhi company initially source the resurrection bush from a large monthly market called the Mona market and then supply a number of local consumers with the raw material. Muthi Futhi have established a key contact and reliable harvesters at the Mona market to buy resurrection bush twigs from and contact them at the beginning of the month to place an order (KI 22, 18 June 2018, South Africa). The site manager from Muthi Futhi collects the raw material and pays the harvesters directly. At the informal market, the resurrection bush twigs are bought per sack. Therefore, no value is added to the species; the sacks only consist of unprocessed twigs.

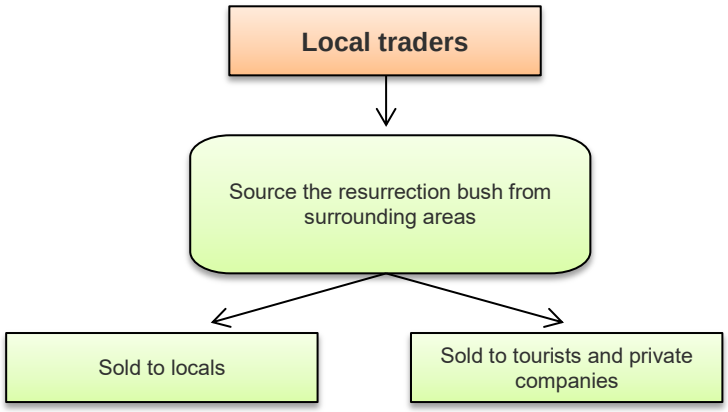


Figure 24: Value chain showing the informal trade of the resurrection bush in Opuwo and Kwa-Zulu Natal.

7.2 Biotrade

A range of products are made from the raw resurrection bush material and are traded locally and internationally. These biotrade activities are illustrated in the value chain depicted in Figure 29.

7.2.1 Kombucha, Zimbabwe

Thrive Zimbabwe make a resurrection bush kombucha and source the raw material independently from the wild. The production manager at Thrive Zimbabwe has the raw material growing near to where he lives and therefore harvests it himself. He is paid per kilogram harvested. Resurrection bush kombucha is fermented tea, which takes approximately 10 days to make. Once made, the kombucha is bottled and labelled and sent to retail outlets across Zimbabwe. Very little equipment and machinery is needed to make the kombucha and therefore specified skills and training are not a requirement to fulfil the production process of kombucha. The company is also considering making other finished goods from the by-products of the resurrection bush kombucha - such as facial toners, fruit leathers, face masks, and dog chews (KI 18, 14 May 2018, Zimbabwe).

7.2.2 Pharmaceuticals, Zimbabwe

Wild Health formulates resurrection bush capsules and flu mix capsules containing the species, which is independently sourced from the wild. The process involved in making the capsules requires minimal labour and simple technologies. The raw material is sun dried, milled, and sieved and is then encapsulated in gelatin capsules. The capsules are then counted

and packaged for retail. Although no clinical trials have been conducted to prove the benefits of using the capsules, the respondent from Wild Health said: "I am convinced of its benefits" (KI 21, 18 June 2018, Zimbabwe). Because the resurrection bush has been used as a traditional medicine for treating colds and flu, Access and Benefit Sharing (ABS) agreements will be needed to enable indigenous and local communities to benefit from the traditional knowledge associated with the species. Currently, however, such agreements have not been negotiated or compiled.

7.2.3 Tea, Zimbabwe

Bio Innovation Zimbabwe (BIZ) and Parceval have commercialised resurrection bush tea and tea blends in Zimbabwe. According to a respondent from BIZ, "we mainly source the resurrection bush from Marula Zimbabwe in Chivi district but we may source from other areas depending on the volumes needed and how quickly we can get it" (KI 6, 14 May 2018, Zimbabwe). BIZ therefore facilitates the supply of the raw material, develops the supply chain, provides training, and assists rural communities to make an additional income by commercialising the resurrection bush. Resurrection bush tea has been traditionally drunk by local and indigenous communities in Chivi district, suggesting the need for ABS agreements. BIZ is therefore in the process of developing benefit-sharing agreements with the Marula Zimbabwe association in Chivi district to compensate them for their knowledge. However, in March 2019 a National ABS Symposium was held in Zimbabwe and one respondent indicated that:

> Participants [at the symposium] (community representatives, representatives from local and national governments, private sector, Universities, the Union for Ethical BioTrade (UEBT) and the ABS Initiative) all agreed that the resurrection bush harvested and sold locally as a tea isn't considered ABS in Zimbabwe. Until and unless current Zimbabwean laws are adjusted, only exported resurrection bush leaves constitute an ABS case (and most likely only if they are going to be exported for research and development purposes and not to bag into teabags) (KI 6, 14 May 2018, Zimbabwe).

It is clear that the resurrection bush has been used by local and indigenous communities as a tea in Zimbabwe and therefore should be considered in future ABS agreements. However, traditional knowledge associated with the resurrection bush extends beyond Chivi district and one respondent highlighted that identifying traditional knowledge holders is going to be a

challenge in Zimbabwe because the country does not have adequate databases (KI 17, 18 April 2018, South Africa).

7.2.4 Herbal tea, Zimbabwe

Speciality Foods of Africa makes a resurrection bush herbal tea and sources raw resurrection bush material from the Indigenous Tea Company Zimbabwe (ITCZ) in Nyanga. Dry resurrection bush twigs are crushed and sifted into a specified particle size and are then placed into a tea bagging machine. The machine is automated and dispenses the tea into the tea bag paper and seals and cuts the tea bags. The tea bags are then packaged and distributed to retailers across Zimbabwe (KI 20, 7 May 2018, Zimbabwe). The company's loose tea consists of crushed and sifted resurrection bush twigs, which is packaged and distributed. The company has not developed any formal agreements with the harvesters in Nyanga. The company considers their use of the resurrection bush as biotrade and does believe there is a need for an ABS agreement.

7.2.5 Infused gin and herbal tea, Western Cape, South Africa

Parceval (Western Cape, South Africa) has supplied a craft gin company in the Western Cape called Ginny Fowl Gin with the resurrection bush sourced from Zimbabwe to develop a resurrection bush infused gin. According to Ginny Fowl Gin, "the resurrection bush has been used successfully both after blooming and in a dry form to add flavour to gin. Alcohol is an excellent extractor of essential oils" (KI 25, 25 April 2018, South Africa). Parceval is also piloting resurrection bush loose tea blends with a local nature reserve in South Africa (KI 17, 18 April 2018, South Africa). The company has not developed any ABS agreements for the traditional knowledge associated with the resurrection bush tea, but is currently working with BIZ in Zimbabwe to obtain ABS compliance. No further resurrection bush material will be commercialised in Zimbabwe until this documentation is in place.

7.2.6 Ornamental products, Gauteng, South Africa

Company A cultivates the resurrection bush mainly to allow consumers to experience the unique revitalization potential of the plant. The company uses several sourcing strategies for obtaining the species because "having different sourcing possibilities is an important base for secured material supply" (KI 23, 14 September 2017, South Africa). The company currently has four resurrection bush products in their range. The first is called MyroSpeed (Figure 25),

which contains dry resurrection bush twigs. These twigs serve ornamental purposes. Once the twigs receive water, they turn green in hours.

Figure 25: MyroSpeed

The second product is called MyroCard (Figure 26). This product consists of a postcard with a resurrection bush twig attached to it.

Figure 26: MyroCard

The third product is called MyroMagic (Figure 27). This product consists of a dry resurrection bush twig in a transparent packet.

Figure 27: MyroMagic

The company began selling a fourth product as of 2017. This product, called "Resurrection Bush", consists of a resurrection bush plant in a pot (Figure 28). It is only sold in South Africa.

Figure 28: Company A's "Resurrection Bush" product

All of the products can be purchased locally at selected nurseries or online gardening stores across South Africa. As one respondent explained, "exporting the whole resurrection bush plant is significantly challenging due to phytosanitary regulations of importing countries" (KI 23, 14 September 2017, South Africa). The company therefore only exports their MyroMagic, MyroSpeed, and MyroCard products. These products are sold to customers in Germany, Switzerland, and Hong Kong (KI 23, 14 September 2017, South Africa). Because

these three products are marketed as ornamental plant products, they are therefore exempt from South African ABS legislation and regulations (DEA, 2012).

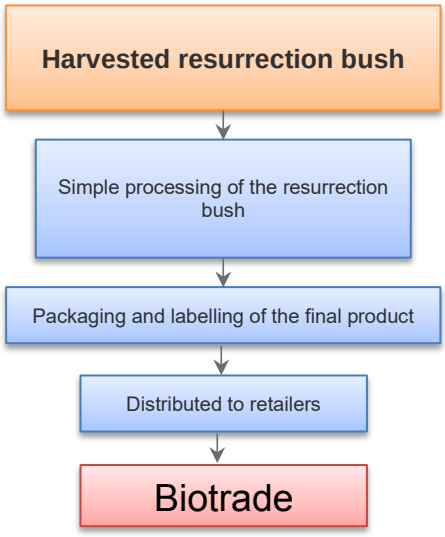


Figure 29: Value chain showing the commercialisation of the resurrection bush for biotrade activities.

7.3 Bioprospecting

Bioprospecting involves any research on, or development or application of, indigenous biological resources for commercial exploitation (Gericke, 2011). Therefore conducting research and development on the resurrection bush and/or its biochemical composition to make products for specific uses is subject to ABS regulatory requirements. The value chain of the commercial activities associated with the resurrection bush for bioprospecting is illustrated in Figure 31.

7.3.1 Exported raw material for Extract 1, Zimbabwe

KAZA Natural Oils (Zimbabwe) is currently supplying the resurrection bush to a company in the United Kingdom (UK) to develop an extract for an internationally renowned cosmetics company. The raw material is sourced from Domboshava, a village in Zimbabwe. KAZA Natural Oils has not developed any ABS agreements with the harvesters in Domboshava but has expressed interest in sourcing the resurrection bush through the structures set up by BIZ (Zimbabwe) in order to avoid entering into multiple benefit-sharing agreements with numerous resurrection bush harvesters across Zimbabwe (KI 19, 7 May 2018, Zimbabwe). KAZA Natural Oils is not interested in selling raw resurrection bush material to other companies but focuses rather on selling extracts and oils (KI 19, 7 May 2018, Zimbabwe).

Although sophisticated technology is used to make the resurrection bush extract using multiple extraction methodologies, the processes and procedure developed to make the extract have not yet been finalised. As an informant from the company explains:

> A specific combination of compounds has been used as a marker and different solvents and extraction technologies are being explored to determine which approach will yield the most desired outcomes (KI 19, 7 May 2018, Zimbabwe).

7.3.2 Exported raw material for Extract 2, Gauteng, South Africa

Company A in South Africa sells raw resurrection bush material to "an internationally known company who has been supplying active ingredients to the cosmetic industry for more than 50 years" (KI 23, 14 September 2017, South Africa). This resurrection bush extract is distributed internationally, yet is unknown whether the company developing these extracts has obtained a bioprospecting permit (KI 23, 14 September 2017, South Africa).

7.3.3 Extract 3, Western Cape, South Africa

Parceval has a specific range of cosmetics called Flora Africana. For this range, Parceval sources the raw material from BIZ (Zimbabwe) and develops a resurrection bush extract. The extract is water based and is mixed with glycerine for moisturising effects (KI 17, 18 April 2018, South Africa). Parceval uses hydroglycerites in their extracts because using alcohol as a solvent is thought by the industry to dehydrate the skin (KI 17, 18 April 2018, South Africa). First, the raw resurrection bush material is milled. Then water extraction takes place. This is filtered through a cartridge or membrane and is mixed with glycerine, preservatives, and other ingredients that maintain the properties that the customers are looking for (KI 17, 18 April 2018, South Africa).

7.3.4 Extract 4, Kwa-Zulu Natal, South Africa

In Kwa-Zulu Natal, Intiki has engaged in a joint venture ABS agreement with the KCINP Trust to develop an extract from the resurrection bush for anti-aging purposes. The ABS agreement between the two parties was developed with the assistance of Nakamhela Attorneys. The scope of the agreement covers all necessary components stipulated by the Nagoya Protocol, including Prior Informed Consent (PIC) and Mutually Agreed Terms (MATs). The agreement was signed by Intiki and the KCINP Trust in March 2017. A simplified version of the complex solvent extraction process used by Intiki in the production of the resurrection bush extract is outlined in Figure 30.

7.3.5 Extract 5, Kwa-Zulu Natal, South Africa

Zuplex sources the resurrection bush from Muthi Futhi to develop a resurrection bush extract called Myravive. Myravive is a cosmetic product intended for use as a rapid hydration ingredient that promotes elasticity, firmness and smoothness of dermal and epidermal layers of skin (TDS, n.d.). This standardised resurrection bush extract is made using propanediol and water as a solvent (KI 22, 18 June 2018, South Africa). According to one informant, some people use glycerine as a solvent, but glycerine doesn't extract as nicely as organic, accredited propanediol does, which suppresses bacteria and is good for cosmetics. (KI 22, Zuplex, 18 June 2018, South Africa). Vats are used to make the resurrection bush extract. No preservatives or additives are added and therefore the shelf life of the extract lasts for 24 months after the manufacture date. Micro tests are done before the extract is sent to the distributors (KI 22, 18 June 2018, South Africa).

7.3.6 Extract 6, Milan, Italy

Giorgio Armani has a skincare range called Crème Nera which contains an extract of the resurrection bush. Resurrection bush twigs for the extract were recently sourced from Company A (KI 2, pers.comm., July 18). The extract is produced in the Giorgio Armani laboratories. These laboratories use a lot of green chemistry in their production processes (KI 2, pers.comm., July 18).

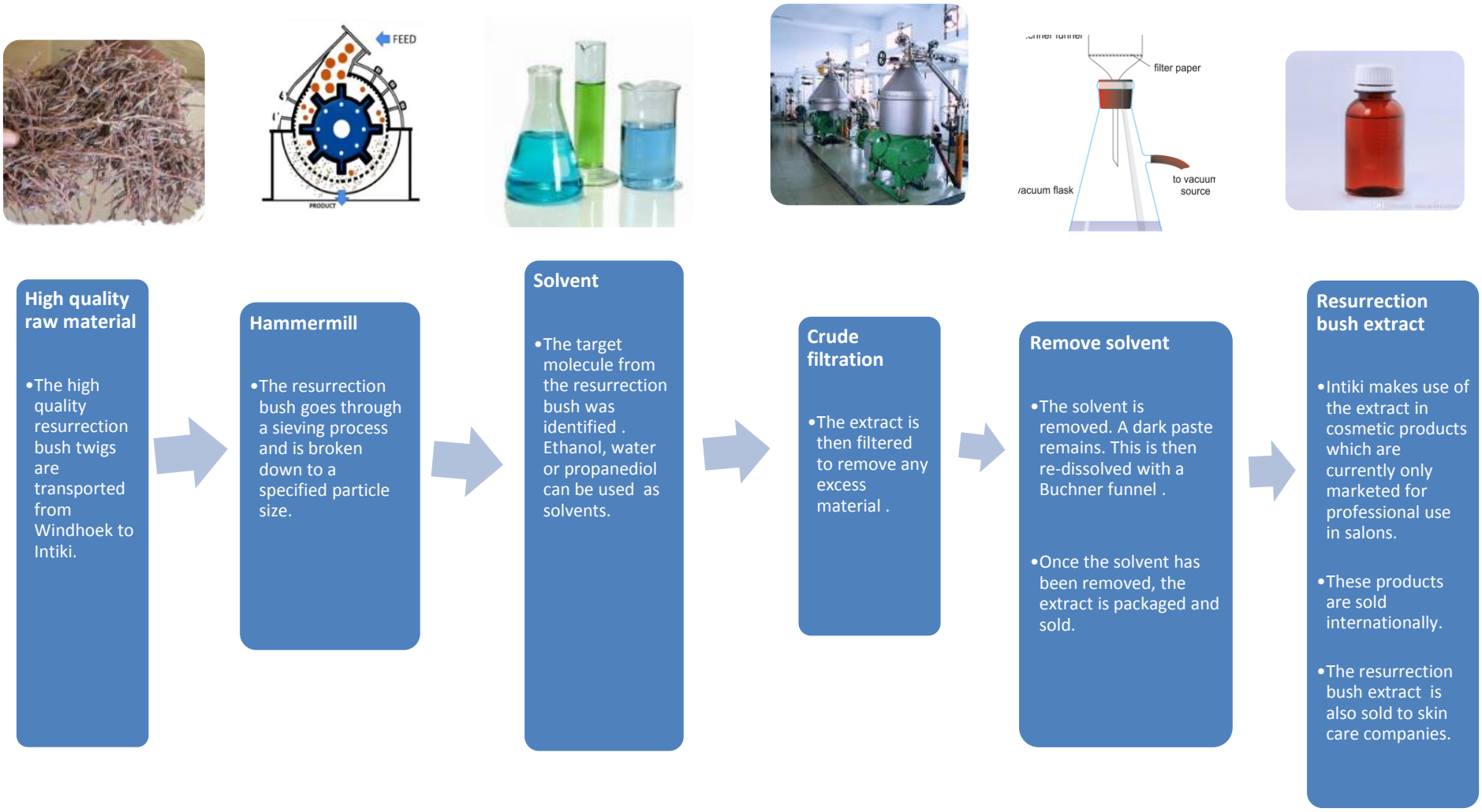


Figure 30: Solvent extraction process used by Intiki

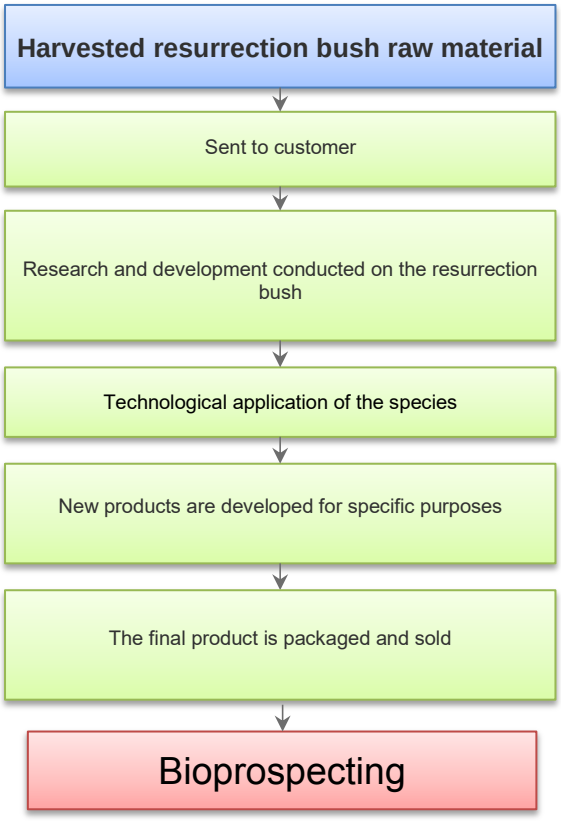


Figure 31: Value chain showing the commercialisation of the resurrection bush for bioprospecting activities

7.4 Conclusion

This chapter has outlined the three main commercialisation approaches associated with the resurrection bush: informal trade, biotrade, and bioprospecting. Each commercialisation approach follows a different process to result in the formation of a range of end products. As the commercialisation activity moves from informal trade to bioprospecting, the products become more specialised, involving more sophisticated technology and machinery and more qualified staff. The type of agreements needed for accessing the resurrection bush become more formalised as commercialisation begins to incorporate research and development components. The next chapter examines these formalised agreements in more detail.

8. Chapter 8 – Results: Regulation of trade and use of the resurrection bush

In Namibia, Zimbabwe, and South Africa, different laws have been enforced which regulate the trade and use of the resurrection bush and/or associated traditional knowledge. As a result, a range of agreements have been developed, resulting in diverse benefits for harvesters and natural resource management approaches. These will be discussed in the sections which follow.

8.1 Zimbabwe

The commercial harvesting of natural resources has occurred for many years in Zimbabwe. The adoption of the CBD in 1993 provided requirements for ABS which led Zimbabwe to develop associated legislation in 2009. Therefore, even prior to implementation of the Nagoya Protocol in 2010, Zimbabwe had regulatory frameworks which spoke to the aims of the Protocol. The *Statutory Instrument 61 of 2009* (Access to Genetic Resources and Indigenous Genetic Resource-based Knowledge) Regulation, however, has never been successfully implemented. Speaking to the lack of its proper implementation, one respondent explained that:

> The issue is that everyone in government wants responsibility for ABS but without having the capacity to handle it. If you go to the Environmental Management Agency, who are the custodians of the *Statutory Instrument 61 of 2009*, the capacity [supposedly] lies at head office but if you go down to where it should be applied or implemented - no one there knows. Likewise, if you go to the Ministry of Environment (MoE), the capacity for ABS is not even there at the moment and no one is actually leading the process (KI 8, 14 May 2018, Zimbabwe).

Expanding on the absence of *Statutory Instrument 61 of 2009* implementation, the respondent further added that:

> For years, Zimbabwe has been an agricultural, mining and tourism country and that's where the focus has remained. Natural resources are just another area that no one has taken the time to give attention to. In the meantime, Zimbabwe has been a site of massive resource plundering and no one has been responsible for that. It is time that Zimbabwe gives more thought to it and puts more funds towards it – invest in research, databases and knowledge of what is currently happening to our resources. If we as

> private institutions do not play a role in doing that, then no one is filling that gap (KI 8, 14 May 2018, Zimbabwe).

BIZ is an example of one such private institution which is currently attempting to fill that gap. Since Zimbabwe became party to the Nagoya Protocol on Access and Benefit Sharing in November 2017, the processes involved with applying ABS agreements when sourcing natural products, has not yet been fully articulated. This creates a barrier for organisations seeking to comply with the Protocol and for local communities to benefit fully and fairly from the commercialisation of Zimbabwe's natural resources (KI 8, 14 May 2018, Zimbabwe). As a result, BIZ is currently in the process of being the first and only organisation to implement ABS in the country.

The section which follows will describe the regulatory requirements associated with commercial access to natural resources and/or associated benefit-sharing agreements that are linked to the resurrection bush in Zimbabwe.

8.1.1 Sustainable use and access

8.1.1.1 Access to harvest the resurrection bush

According to the *Forest Act 17 of 1996*, access to harvest any forest product within Zimbabwe requires permission from local authorities. If a request is approved, a harvesting permit must be obtained from local forestry officials. The permit system has been set-up as a payment for selling the resurrection bush commercially outside of the area where it was harvested. In addition, the permit also grants non-Chivi district residents permission to commercialise the resurrection bush. According to one respondent:

> Those interested in buying a particular plant have to approach the local RDC for permission to engage with local communities to collect the plant and then they are issued a collection permit jointly signed by Council and the local Forestry Officer (KI 11, 10 May 2018, Zimbabwe).

In Chivi district, for example, the Chief Executive Officer (CEO) explained that if someone from outside of the district wanted to purchase the resurrection bush, they would first have to go to the Rural District Council (RDC) offices and inform them of their intended commercial activity. The RDC would then send them to the local Forestry Commission where they would

need to get a harvesting permit. The buyer would then be granted access and could then purchase the resurrection bush from the community (KI 12, 11 May 2018, Zimbabwe).

One respondent described a different process to accessing the resurrection bush:

> First a harvesting permit is required from the Forestry Commission and then approval from the CEO and District Administrator (DA) needs to be granted. Then the local Environmental Management Agency (EMA) needs to be informed and then access to the resurrection bush is granted (KI 14, 11 May 2018, Zimbabwe).

Therefore, it is evident that there are large discrepancies between what is required in order to obtain access to the resurrection bush and what is not. This is supported by the lack of understanding by the DA in Chivi district of the processes involved. The DA said:

> Since selling the resurrection bush is a new thing in our district, we should have the knowledge and we should be trained as a district on how to commercialise it (KI 13, 11 May 2018, Zimbabwe).

8.1.1.2 Access to genetic resources

Access to genetic resources in Zimbabwe has mainly taken place without much regulation. For example, before Zimbabwe became party to the Nagoya Protocol, commercial parties seeking access to raw material would contact BIZ stipulating how many kilograms of the resurrection bush they required. BIZ would organise a phytosanitary certificate and export permit if the customer was outside of Zimbabwe. The buyer would then arrange an import permit for the raw material. No PIC, Benefit-Sharing Agreements (BSAs), or Material Transfer Agreements (MTAs) were obtained. Since becoming party to the Nagoya Protocol, however, accessing the resurrection bush in Zimbabwe will require stricter levels of compliance. According to *Statutory Instrument 61 of 2009*, Prior Informed Consent (PIC) needs to be obtained from the community concerned, and appropriate mechanisms need to be implemented for the fair and equitable sharing of benefits derived from the utilisation of genetic resources (EMA, 2009). Once these measures have been put in place, a bioprospecting licence will be issued.

One respondent explained the process involved with accessing the resurrection bush for commercial purposes. They noted that:

> If you want to harvest for commercialisation, you are required to go to the area where the resource is found and come up with Mutually Agreed Terms (MATs) with the community of how they are going to benefit. Then you go to the national EMA director general who then calls a national evaluation committee to assess the MATs. If that process is successful, you are supposed to get a licence (letter of permission) once all the conditions of the *Statutory Instrument 61 of 2009* have been met (KI 10, 9 May 2018, Zimbabwe).

The custodians of the *Statutory Instrument 61 of 2009* explained that the research council and National Biotechnology Authority (NBA) in Zimbabwe need to be consulted in order for commercial activities associated with the resurrection bush to take place. One respondent advised that:

> A buyer has to work with local authorities and traditional leaders in the area where the resource is found. They also have to comply with the guidelines of *Statutory Instrument 61 of 2009*. If harvesting of the resource is for research purposes, the research council of Zimbabwe needs to be informed and clearance needs to be given. The NBA also needs to be involved. It depends on a case-by-case basis and what the research is on and where the plant is located (KI 9, 7 May 2018, Zimbabwe).

The NBA is mainly responsible for developing Zimbabwe's biotechnology, research, and development capacity and for transferring biotechnology research and development results into products and services (NBA, 2014). Yet the national EMA are the only department to recognise the NBA and their role in biotechnology, research, and development in the country.

Private companies and NGOs who deal directly with the communities and purchase indigenous natural resources, on the other hand, have explained different processes for accessing and commercialising genetic resources. One informant explained that:

> Thirty years ago, CAMPFIRE, a benefit-sharing scheme around consumptive and non-consumptive utilisation of wildlife was implemented in Zimbabwe. Zimbabwe was a world leader for this because it clearly defined the benefit-sharing mechanisms and procedures. It was designed for wildlife, but it translates perfectly into plants. In the 90s there was an agreement that local district councils would use the same procedures for benefit-sharing agreements for plants. To this day, if you follow those procedures then it's fine. The process basically follows that because plants legally belong to the RDCs, you need a harvesting permit from the RDC, all necessary permits from national

> government, and a signed Material Transfer Agreement (MTA) - irrespective of what is set out in the *Statutory Instrument 61 of 2009* because those procedures don't function; they are implemented in law but not in practice (KI 19, 7 May 2018, Zimbabwe).

BIZ, the first organisation in Zimbabwe to implement ABS, is engaging with communities for the commercial use of the resurrection bush as a tea. The process they are following in order to commercialise the resurrection bush does not involve permits from national government. One respondent stated that:

> We [BIZ] have always introduced our activities to local authorities and local leadership. We have always paid for harvesting permits to the Forestry Commission. It's not as if we have not followed the rules at all but it seems those were the only ones we needed to follow and that is mostly what we have done (KI 6, 14 May 2018, Zimbabwe).

Another informant added that:

> National government have said that we [BIZ] should come up with our own ABS agreements and come back to them with the documents – we have not received any guidance from the government or their policies on how we should implement them (KI 8, 14 May 2018, Zimbabwe).

BIZ has therefore developed ABS procedures based on international best practice. At a provincial level, the organisation has received permission from Masvingo province to work in Chivi district and to commercially harvest the resurrection bush. Prior Informed Consent (PIC) is included in a Memorandum of Understanding (MoU), which was compiled with assistance from the Union for Ethical BioTrade (UEBT) (KI 8, 14 May 2018, Zimbabwe). The document was signed in May 2018 by BIZ, Chivi RDC, and the Chivi DA. The MOU has seven sections, consisting of: a background to BIZ, the impact (social, ecological and economic) of commercialising the resurrection bush, the objectives of commercialising the resurrection bush, the activities and projects of the implementing partner (BIZ), the obligations and responsibilities of both parties in commercialising the resurrection bush, the duration of the agreement, and conditions for its termination. In conjunction with this, BIZ has received a harvesting permit from Chivi district Forestry Commission for the commercial harvesting and sale of the resurrection bush. BIZ still need to inform local leadership (chiefs, headmen, village heads) of the ABS project where MATs will be negotiated to compensate for the commercial use of the resurrection bush and its associated traditional knowledge.

National government will then review all documentation and, if the process meets the requirements set out by the *Statutory Instrument 61 of 2009*, access to the resurrection bush will be granted.

However, BIZ has raised concerns for the implementation of ABS agreements in the country. One informant stated the need for:

> Skilled people in the relevant positions who are trained and know what ABS is about, a database of the resources in the area and who is using them, and the course of action and the stages to be taken when developing ABS agreements. It should be clear to every player who comes to the country what procedures and processes need to be followed (KI 8, 14 May 2018, Zimbabwe).

The informant further emphasised that:

> There has to be a focal person, there has to be a committee, there has to be someone in the relevant ministry that handles it [ABS] - without that, people will continue to take advantage of the system (KI 8, 14 May 2018, Zimbabwe).

8.1.2 Benefits from the resurrection bush

8.1.2.1 Monetary benefits

Amongst all of the different harvesting associations, collectors received between $1 -$2.50 (equivalent to R12 – R30) per kilogram of resurrection bush twigs and leaves between 2017 and 2018. The plan is that once a MAT has been negotiated with Marula Zimbabwe in Chivi district, the amount paid to harvesters per kilogram of raw material will be finalised (KI 6, 14 May 2018, Zimbabwe). However, should the harvest area for the resurrection bush expand to other areas, a resurrection bush collectors association or co-operative will be formed, and benefit-sharing negotiations will take place with that association (KI 17, 18 April 2018, South Africa). According to a respondent, the BSAs are likely to take a two-prong approach. The one benefit will serve the individual harvester, who will be paid directly for the amount of raw material harvested; the second benefit will be a percentage share from the sales of the final product, which will be deposited into a communal fund for the benefit of the whole community (KI 6, 14 May 2018, Zimbabwe). Usually each district or ward has a development committee who devise annual development plans. The percentage share from ABS projects will be allocated to specified development plans for that given year.

One respondent described the current monetary benefits derived from commercialising baobab and expected that similar processes would take place for the resurrection bush. This respondent explained that:

> When baobab gets sold to a customer who has signed a benefit-sharing arrangement, there is an additional benefit. That benefit works on 2 levels – a portion of it goes back as an extra 10% on the purchase price of the raw material. For example, if the purchase price of the raw material is R1 per kg then 10% of that is 10 cents. So, we sell it to the consumer for more than one Rand and give the community the extra 10 cents per kg sold. The other part of the benefit goes to the association, which is an additional 5% per kg. A lump sum is then paid into the association's account at the end of each year. The association decides what they want to do with that money. For example, last year the baobab association decided they wanted to buy school exercise books for the children in the area. (KI 19, 7 May 2018, Zimbabwe).

8.1.2.2 Non-monetary benefits

In addition to the extra income that communities stand to receive from commercialising the resurrection bush, one national government official also noted that buyers could bring development activities into communal areas (KI 10, 9 May 2018, Zimbabwe). An example of this was described by a local government official, who explained that:

> If you commercialise the resurrection bush, and if, for example, the government has intentions to drill 10 boreholes in Chivi district in 2018, the money we get from commercialising the resurrection bush can be put into drilling two boreholes and the government will only have to fund eight (KI 13, 11 May 2018, Zimbabwe).

Another local government official also highlighted the non-monetary benefits that the commercialisation of the resurrection bush could bring, stating that: "Right now, our roads are not good, but if a buyer comes for our natural resources, the opportunity can arise to have our current infrastructure improved" (KI 14, 11 May 2018, Zimbabwe).

8.1.3 Natural resource management

In terms of natural resource management in Zimbabwe, a national government official stated that: "All plant life is protected – either under the *Environmental Management Act, Forestry Act, Parks and Wildlife Act* or Plant Protection under the Ministry of Agriculture" (KI 10, 9

May 2018, Zimbabwe). The official further emphasised that: "Unless there are alarm bells, the existing laws protect our plant species" (KI 10, 9 May 2018, Zimbabwe). Another national government official highlighted that there are two systems in place to conserve natural resources. Firstly, the traditional customs and norms that communities follow which are implemented by traditional authorities, and secondly, the statutes and regulations enforced by national government to complement what has been implemented on the ground (KI 9, 7 May 2018, Zimbabwe).

However, according to a local government respondent, "there aren't really any efforts in place to conserve natural resources on the ground – each traditional leader has their own way of governing and harvesting natural resources" (KI 14, 11 May 2018, Zimbabwe). As a result, local government in Chivi district are in the process of developing their own set of bylaws (KI 12, 11 May 2018, Zimbabwe). Speaking on the development of these bylaws, one informant explained that:

> The bylaws are intended to protect natural resources and to ensure that when natural resources are harvested, they are done so in a sustainable way. A Natural Resources Department is going to be set up in Chivi district which will be headed by a qualified person to train communities on how to monitor the utilisation of natural resources, manage the marketing of biological products, and how the revenue from those products could be used for the benefit of the whole community (KI 12, 11 May 2018, Zimbabwe).

In the meantime, because BIZ is in the process of implementing an ABS agreement with Chivi district, they have only developed a PIC document. The document states that BIZ will equip harvesters to organically and sustainably harvest the resurrection bush. BIZ is currently one of the few organisations to implement sustainable harvesting activities for natural resources on the ground. They have conducted resource mapping of the resurrection bush and found that it is a highly abundant species, particularly in Chivi district (KI 7, 11 May 2018, Zimbabwe). A quadrant system has been employed to allow for rotational harvesting. Each year, the resurrection bush is collected from a different quarter and given three to four years to rejuvenate before it is harvested again (KI 7, 11 May 2018, Zimbabwe). Harvesters received training from BIZ on how to collect the resurrection bush sustainably and were taught to harvest healthy and mature leaves during recommended periods, not to damage the plant while harvesting, and not to uproot the whole plant or remove the main trunk (BIZ,

n.d.). All of the resurrection bush collectors stated that they only harvest a few twigs from each resurrection bush between April and November, when there is no rain. A local government official stated that it was their role to guide harvesters on how to sustainably harvest natural resources but had no idea how the resurrection bush was being harvested or how it should be sustainably collected. It is evident that government officials on the ground do not play an active role in protecting and conserving their natural resources. Rather, it is left to private institutions and NGOs to ensure that natural resources are protected and utilised in a sustainable manner.

8.1.3.1 Conservation

The Nagoya Protocol prescribes ways in which genetic resources should be accessed with the expectation that the benefits from their use will be shared to create an incentive for conservation and the sustainable use of natural resources. According to Section 1 (c) of *Statutory Instrument 61 of 2009*, one of the key purposes of the ABS regulatory framework is to "ensure the conservation and sustainable use of genetic resources in order to maintain and improve their diversity as a means of sustaining the people of Zimbabwe" (EMA, 2009). Section 2 (a) (i) of the Instrument states that the Genetic Resources and Indigenous Genetic Resource-based Knowledge Protection Committee will develop long-term policies and guidelines for the conservation and sustainable use of genetic resources and their components (EMA, 2009). However, in practice, this is not the case. According to an informant:

> Zimbabwe has theoretical ABS legislation (*Statutory Instrument 61 of 2009*) but it doesn't work, and it cannot work. For example, there is supposed to be a national benefit-sharing committee, but it doesn't exist - it's never been established (KI 19, 7 May 2018, Zimbabwe).

The PIC document between Chivi district and BIZ does not mention any activities relating to the conservation and protection of the resurrection bush in the long term. This may, however, be included in the MAT, which has not been completed yet. Despite this, BIZ is in the process of exploring cultivation trials on the resurrection bush to ensure that if demands increase, the necessary precautionary measures can be implemented.

8.2 Namibia

The new ABS law in Namibia is aimed to ensure the fair and equitable benefits for communities who are (in most cases) disregarded, while providing a transparent way to access, use, and trade genetic resources (KI 3, 19 October 2017, Namibia). The Interim Bioprospecting Committee (IBPC) has been responsible for all ABS related activities in the country and has tried to maintain international best practice by consulting academic literature and the Nagoya Protocol (KI 4, 19 October 2017, Namibia). In practice, however, the IBPC have fallen short of meeting their objectives. As one informant, who has been part of the IBPC since its inception, explained:

> The bioprospecting committee doesn't work, and it hasn't for years. Basically, it was supposed to educate and communicate on ABS nationally; it was supposed to look at processes around ABS; it was supposed to provide input into bioprospecting related applications and research permit applications that had relevance to ABS; it was supposed to protect the accessing of genetic resources and… I can carry on. The reality in the end was that it did very little of anything actually, except blow off a lot of hot steam in workshops*"* (KI 5, 20 October 2017, Namibia).

Now that Namibia is a signatory to the Nagoya Protocol, laws and regulations have recently been adopted which govern access to biological and genetic resources. The following section will highlight the regulatory requirements associated with accessing the resurrection bush and provide an example of how ABS is currently being implemented.

8.2.1 Sustainable use and access

8.2.1.1 Access to harvest the resurrection bush

In Namibia, the harvesting of indigenous plant species is devolved to community forests, provided that the harvesting methods are sustainable (KI 1, 5 October 2017, Namibia). Commercial actors seeking access to biological resources in Namibia for commodity trade or biotrade purposes are required to obtain an access permit. The application for such activities is examined on a case-by-case basis to determine which regulatory requirements will apply. An export permit and phytosanitary certificate is required from the Ministry of Agriculture, Water and Forestry (MAWF) for any material transported out of the country.

8.2.1.2 Access to genetic resources

According to the regulations under the *Access to Biological and Genetic Resources and Associated Traditional Knowledge Act (Act No. 2 of 2018),* in order to gain access to genetic resources, a Prior Informed Consent (PIC) document needs to be completed. Once PIC has been granted, an application must be submitted for an access permit. If the application is successful, a benefit-sharing agreement containing Mutually Agreed Terms (MATs) must be entered into with the necessary knowledge holders (MET, 2018). In rare cases where joint venture agreements are devised and raw material is offered to a commercial partner, PIC is not required. For example, the Kunene Conservancies Indigenous Natural Products (KCINP) Trust offered the resurrection bush raw material to Intiki to develop a resurrection bush extract. Access to the genetic resource was not sourced independently by Intiki, and therefore PIC was not mandatory.

8.2.2 Benefits from the resurrection bush

8.2.2.1 Monetary benefits

There is currently only one commercial activity taking place which is associated with the resurrection bush sourced from the KCINP Trust. Harvesters receive N$100 per kilogram of resurrection bush raw material (the equivalent of R100) (KI 1, 5 October 2017, Namibia). According to a local government respondent, "when the resurrection bush is bought from communities, it creates employment, and harvesters get paid to buy food for their households" (KI 15, 3 October 2017, Namibia). A Benefit-Sharing Agreement (BSA) has been developed between the KCINP Trust and Intiki. The agreement stipulates that Intiki will pay N$265 per kilogram of resurrection bush twigs and leaves (the equivalent of R265.00), which will be deposited into the Opuwo Processing Facility (OPF) account. This covers the N$100 paid to harvesters per kilogram of raw material (which will be refunded into the revolving fund account). The remaining N$165 (the equivalent of R165) is used to cover the costs of sorting and repacking the material and transporting it to Windhoek. It is also used to assist with accessing the required export permits. An additional benefit, such as an agreed percentage of the sales price of the final product, is yet to be determined. One respondent emphasised the need for harvesters to receive benefits that are equitable, stating that the price harvesters receive for the raw material and the retail price of the final product is unfair. This respondent said:

> I feel like, realistically, I don't like these prices, especially given that we are paying the communities such a little [R265.00] for the actual material. We went in 30-40% cheaper than Company B [for the resurrection bush extract]. We've got a product very much equivalent to theirs so I just wanted some market uptake. If we came in at R1000 we wouldn't be taken seriously – people would question why Company B is selling their resurrection bush extract for R5500 and we are selling ours for R1000. (KI 16, 31 August 2017, South Africa).

The KCINP Trust accounts are reviewed annually. Once the operational costs and allowances made for contingencies and repairs have been covered, the remaining funds are distributed to the relevant conservancies according to the benefit distribution plan of the Trust (KI 1, 5 October 2017, Namibia). Each conservancy that is part of the KCINP Trust and supplies raw material to Opuwo Processing Facility (OPF), gets a percentage share based on the value of all raw material collectively harvested. For example, by 2017, Puros conservancy had supplied N$681 905 worth of raw material to OPF and therefore qualified for a 35.67% benefit proportion. Otjitanda conservancy, on the other hand, only supplied N$4210 worth of raw material and so their benefit distribution percentage was much lower (0.22%). Each conservancy then has a benefit distribution plan for the funds allocated to them.

8.2.2.2 Non-monetary benefits

The non-monetary benefits derived from the ABS agreement between the KCINP Trust and Intiki include the sharing of research results with all necessary stakeholders and the training of KCINP Trust members on how to sustainably harvest the resurrection bush by local NGOs. Intiki developed the extraction process of the resurrection bush extract and has shared this intellectual property with the Trust.

8.2.3 Natural resource management

Namibia's *Nature Conservation Ordinance of 1975* contains laws that relate specifically to the conservation of nature (MET, 1975). If commercial activities are associated with a protected species, then evidence of resource sustainability is required. Such sustainability measures include non-destructive harvesting methods, offtake quotas or cultivation (KI 5, 20 October 2017, Namibia). The *Environmental Management Act 7 of 2007* was enforced to promote the sustainable management of the environment and use of natural resources. Section 2 (e) of the Act states that "assessments must be undertaken for activities which may

have a significant effect on the environment or the use of natural resources" (EMA, 2007). The *Forest Act of 2001* furthermore allows for the devolution of resource rights to the community. In accordance with this Act, establishing a community forest requires the formation of a forest management committee. The forest management committee is responsible for supporting and supervising the participatory development of community forest management plans that ensure sustainable resource use (DoF, 2012).

NGOs in Namibia play a vital role in supporting community forests by ensuring that sustainable harvesting activities required under community forest constitutions and regulations are enforced for commercial species. . A national government official emphasised that "a completed resource inventory is essential if you want to do business with plants" (KI 3, 19 October 2017, Namibia). Accordingly, Integrated Rural Development and Nature Conservation (IRDNC) have conducted resource inventories on the resurrection bush and have found that there is an abundance of the resource in the Kunene region. Trial harvesting methods of the resurrection bush were carried out by IRDNC and the most sustainable harvesting method was explained to harvesters (KI 1, 5 October 2017, Namibia). Practical demonstrations were presented with the aid of pictures and samples of the species (IRDNC, 2016). There were five rules stipulated for harvesters collecting the resurrection bush. The five rules are as follows: (1) only trained and registered harvesters may collect the resurrection bush, (2) only new growth twigs may be harvested, (3) the size of the twigs harvested must be finger length, (4) no woody old growth with flowers will be bought, and (5) no plants may be pulled out of the ground (IRDNC, 2016). All of the harvesters that received training and take part in the commercial activities associated with the resurrection bush said that they only harvest the twigs. As one resurrection bush harvester explained, "I only collect the twigs that are light in colour, the new twigs, and leave the rest of the bush in the ground" (Respondent 29a, Orupembe conservancy, 5 October 2017).

8.2.3.1 Conservation

Long-term conservation efforts associated with the resurrection bush in Namibia are absent due to the understanding that there is an abundance of the resource in the country and that current demands are extremely small in comparison to the supply. Conservation measures which require strict access procedures and harvesting permits are only enforced if a species is declared protected (KI 24, 7 November 2017, Namibia). Therefore, in the *Access to*

Biological and Genetic Resources and Benefit-Sharing Regulations of 2018, the word "conservation" is only mentioned twice in the document. Its first appearance relates to a medium-term benefit-sharing option, such as access to scientific information relevant to conservation and the sustainable use of biological diversity (MET, 2018). The second refers to a long-term benefit-sharing option through the payment of fees into a trust fund that supports conservation and the sustainable use of biodiversity (MET, 2018). These are benefit-sharing possibilities which have been suggested by national government but are not obligatory to enforce. Therefore, the ABS agreement between the KCINP Trust and Intiki does not prescribe any measures for the conservation of the resurrection bush.

8.3 South Africa

In South Africa, the objectives of the *Bioprospecting, Access and Benefit-Sharing (BABS) Regulations of 2008* were to address injustices of the past, to achieve the conservation and sustainable utilisation of indigenous biological or genetic resources, and to recognise existing traditional knowledge pertaining to the usefulness of indigenous biological/genetic resources. In practice, however, the regulations have proven to achieve otherwise (Wynberg, 2017; PhytoTrade Africa, 2015). This section provides reasoning for why this is possibly the case for South Africa, highlighting the regulatory requirements associated with accessing the resurrection bush and developing benefit-sharing agreements (BSAs).

8.3.1 Sustainable use and access

8.3.1.1 Access to harvest the resurrection bush

In South Africa, accessing biological resources and accessing genetic resources follows similar processes and procedures. Before access to biological resources or traditional knowledge can commence, PIC needs to be granted by the owners of the resource (RSA, 2015). The user is expected to fully disclose all information relating to the intended use of the resource and the method in which the resource will be harvested. If granted, a Material Transfer Agreement (MTA) must be signed by both parties for providing access to the resource. A BSA must then be negotiated. In addition, if there are any provincial requirements for access to a particular species, these need to be adhered to. The DEA reviews all of the documentation in the application for a biotrade permit, and if successful, the user is given permission to access the biological resource.

8.3.1.2 Access to genetic resources

In South Africa, all commercial activities associated with biological and genetic resources are legally interpreted to comprise bioprospecting and therefore ABS regulations apply to biological and genetic resources, including biotrade. Therefore, to access genetic resources in South Africa, bioprospecting procedures must be followed. An application is submitted to the DEA where the PIC, MTA and BSA are reviewed. Access to the genetic resource is then determined by the department, and the user is either approved or rejected access. There is one commercial activity associated with the resurrection bush where raw material is sourced within South African borders, yet the access requirements stipulated by the BABS regulations have been circumvented.

For example, Zuplex sources raw material from Muthi Futhi, who purchase resurrection bush raw material from the Mona market. This requires PIC but because there is currently very little regulation around the informal trade of indigenous plant species in South Africa, PIC does not seem to be considered.

8.3.2 Benefits from the resurrection bush

8.3.2.1 Monetary benefits

Very few monetary benefits emerge from the current resurrection bush commercial activities in South Africa. Cultivating the species can potentially reduce employment and additional income opportunities for rural communities who harvest the resource. The main consumers of the resurrection bush in South Africa are local nurseries, who add a mark-up to benefit from the commercialisation of the species. This is a challenge because there are very few benefits derived from the cultivation of the resurrection bush in South Africa, with majority of the sales taking place overseas. However, a bigger challenge is the cumbersome and impractical nature of the ABS legislation in South Africa, which drives a large portion of the natural products industry to source their raw material from other provider countries. This further reduces the potential for local South Africans (and the economy as a whole) to benefit from the commercialisation of the species.

A South African respondent who sources the resurrection bush from Namibia explained why they do not source majority of their raw material from South Africa. The informant said that:

> The first time I ever heard about a bioprospecting permit was by a letter accusing me of being a biopirate and threatening me with a 10-year jail sentence or a massive fine. It is really not a good first touch to really threaten the industry, especially someone like me who proactively was working with Phytotrade [a non-profit membership-based trade association in Southern Africa] to make sure rural communities were being compensated. However, because we made ourselves visible by doing that, we became a target. The way I was treated and threatened pushed me away from buying any raw material in South Africa (KI 16, 31 August 2017, South Africa).

According to Grieber et al. (2012), due to "the lack of legal clarity, certainty and transparency in some domestic ABS legal frameworks, researchers and companies are discouraged from engaging in bioprospecting activities". In response to this, one government official had the following to say:

> We are aware that companies are getting resources from out of the country even though they could get them in country, but we are saying "go and do what you want to do". We can't force you to use our resources, but you are at a loss. Because you are South African you should be looking at ways to contribute to your own country's Gross Domestic Product (GDP). If you are going to someone else because it's easier to access, then so be it. (KI 26, 23 January 2018, South Africa).

One industry respondent in South Africa has completely changed their approach to natural resource commercialisation in the country because of the ABS laws. The respondent stated that:

> Our website used to pitch the idea of "African plants" and now we have changed our tune 180 degrees and don't make mention of Africa or South Africa. I actually try make out as though we are made in Switzerland rather. If you go on our website now you will have to dig deep to find any mention of South Africa. I refuse to pin my whole company on a fickle and whimsical legislation that I don't know where it's going to go next (KI 16, 31 August 2017, South Africa).

One government official states the reason why companies are souring raw material from outside South Africa:

> I am a regulator so for me it's not difficult at all to access material from South Africa - it's A, B, C, D, E. You read and fill out a form… Filling out the form is not the

> problem. People do not want to share benefits, it's as simple as that. They say they want to but no, they don't want to. It's an amount that is taken away from their profit which to them is one less house, one less labourer that they can't have. They just don't want an additional amount taken away from their profits (KI 26, 23 January 2018, South Africa).

According to an industry respondent, however, sharing benefits with local communities is not the problem. The informant said:

> I am very keen on sharing, the people who harvest being remunerated properly - actually, the whole way through the value chain. We make plenty, it's not like we are short in any way so if I can help those people that's brilliant, but what I cannot have is not being able to produce a product because I can only rely on one supplier. So basically, the legislation means that in order to buy from a second local supplier, I would have to get material transfer agreements, ABS agreements and all that is going to take longer than 6 months, so I would rather get it outside of the country (KI 16, 31 August 2017, South Africa).

Zuplex, on the other hand, have not developed any BSAs largely because of the small quantities of resurrection bush used during the start-up phase of their company. The agreement between Muthi Futhi and the consumers they supply states that the price per kilogram includes all the necessary payments. "Muthi Futhi says all we want to do is sell the botanical material at a fair price. It's a commercial transaction and we are happy, we don't want any additional payment" (KI 22, 18 June 2018, South Africa). The company has, however, signed an ABS agreement with the National Khoi and San Council (NKSC) for seven or eight species – one being the resurrection bush – for holding the traditional knowledge associated with them. However, an informant said "it is very confusing when you are buying botanical material because we can pay the NKSC royalty but we are not necessarily buying the material from them" (KI 22, 18 June 2018, South Africa).

8.3.2.2 Non-monetary benefits

The cultivation of the resurrection bush in South Africa has reportedly brought a transfer of knowledge from Switzerland to South Africa (KI 23, 14 September 2017, South Africa). The cultivation of the resurrection bush was initially tried and tested at a botanical garden in

Switzerland and because of its success, the knowledge was shared and transferred to South Africa.

8.3.3 Natural resource management

In South Africa, the Department of Environmental Affairs (DEA) is responsible for all biodiversity and conservation matters in the country. The DEA promulgated the *National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004)* and the *Bioprospecting, Access and Benefit-Sharing (BABS) Regulations of 2008*. *The Biodiversity Act* is further complemented by the Threatened or Protected Species (ToPS) Regulations, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) Regulations, the National Biodiversity Framework, the Provincial Ordinances, and the Indigenous Knowledge System Policy implemented by different departments.

8.3.3.1 Conservation

In South Africa, the *Environmental Conservation Act 73 of 1989* and the *National Environmental Management: Biodiversity Act 10 of 2004* govern the conservation of natural resources in the country. However, one of the many challenges facing South Africa regarding the conservation of natural resources is the use and trade of plants in traditional medicine (Williams, 2003). High levels of unemployment and low levels of formal education, particularly in rural areas, have contributed to the exploitation of economically valuable plants (Williams, 2003). Challenges such as basic primary health care, education and employment in South Africa make the conservation of biodiversity a less pressing concern for the country (Williams, 2003).

A major concern for some companies is not knowing where the resurrection bush sold at informal markets is sourced from. In the words of one respondent:

> We aren't entirely happy about getting material and not knowing where it's coming from. We buy from different people at the Mona market and therefore we cannot make a commitment to traceability and sustainability of the resurrection bush (KI 22, 18 June 2018, South Africa).

The respondent further highlighted that if current volumes of the resurrection bush increased, they would look at a range of suppliers who could ensure that the resource was sustainably harvested. This respondent acknowledged that a properly managed system would be in the best interests of the community (KI 22, 18 June 2018, South Africa).

From a sustainability perspective, an alternative approach to harvesting the resurrection bush from the wild is to propagate the species. One company has realised this and has successfully cultivated the resurrection bush in South Africa to ensure a sustainable supply. According to an informant from this company:

> As I started the [propagation] project I hoped that the use of the resurrection bush would be as big as the use of rooibos. If successful, such a quantity could not be collected in the wild in the long term and therefore sustainable use of the plant material is important (KI 23, 14 September 2017, South Africa).

With regards to cultivating natural resources, however, a mix of responses has been highlighted by numerous respondents. One informant noted:

> Cultivating indigenous plants is highly problematic. Natural plants that grow in the wild are subject to varying natural conditions which provide a better quality active ingredient. You can't assure quality if you cultivate and you take away potential income opportunities from rural communities (KI 24, 7 November 2017, Namibia).

Another respondent stated that: "As soon as something is cultivated then some commercial farmer is going to come along and start growing it and that is going to take it out of the community" (Key informant 17, 18 April 2018).

In Zimbabwe, however, respondents felt that cultivating the resurrection bush was essential to ensure its long-term conservation in the wild. One informant stated that even though the resurrection bush is abundant and that harvesting methods are sustainable, in order to be certain about sustainability, cultivation is imperative (KI 6, 14 May 2018, Zimbabwe). Another respondent expanded on the importance of cultivating the resurrection bush, stating that this:

> Will provide consistency in terms of the properties of the plant because it is often found that raw material harvested from different geographical locations contains different properties and compounds (KI 6, 14 May 2018, Zimbabwe).

8.4 Conclusion

As this chapter has shown there are differences and similarities in the legislative requirements for accessing biological and genetic resources across the three study sites. In Namibia and

Zimbabwe, biotrade and bioprospecting activities are treated differently and follow a unique set of regulatory requirements. In South Africa, however, accessing biological resources and accessing genetic resources require similar produces. This has not only created confusion for users but has driven companies to source raw material from other providing countries. This has thus failed to achieve what was intended by the Nagoya Protocol, focusing specifically on genetic resources. Although appropriate measures have been enforced across all three countries regarding the sustainable use of the resurrection bush, conservation efforts are absent – both on the ground and in agreements. This is one of the objectives of the CBD and Nagoya Protocol that is largely being overlooked.

9. Chapter 9 – Discussion: Commercialisation approaches adopted for the resurrection bush

9.1 Typology of commercialisation approaches associated with the resurrection bush

This research has revealed that there are a number of different commercialisation approaches linked to the use of the resurrection bush. Table 4 highlights these approaches and the key elements that differentiate them.

Table 4: Typology of commercialisation approaches by criterion of classification

	Informal trade	**Biotrade**	**Bioprospecting**
Key components	Biological resources Low quantity	Biological resources Large volumes	Genetic resources High technology
Value chains	Short	Short and long	Mainly long
Actors	Harvesters Private companies	Harvesters NGOs National Government Private companies	Harvesters NGOs National government Private companies
Producer organizations	Not organised	Informal and formal organisations	Mostly formal organisations
Wild harvesting and cultivation	Wild harvested	Wild harvested and cultivated	Wild harvested and cultivated
Access and regulatory requirements	None	Mainly PIC	PIC and benefit sharing
Type of agreement	Informal	Formal and informal	Formal
Benefits	Monetary	Mostly monetary	Mostly monetary
Traditional knowledge use and compensation	N/A	Typically use TK but do not compensate for it	Current cosmetic uses do not use TK
Environmental sustainability **a) Sustainable harvesting**	Unknown	Mostly sustainable harvesting methods are employed	Sustainable harvesting methods are mostly employed
b) Conservation	Unknown	Minimal conservation efforts are adopted	Minimal conservation efforts are adopted

The three commercialisation approaches associated with the resurrection bush are described as informal trade, biotrade and bioprospecting. The informal trade of the resurrection bush is characterised by a short value chain, involving harvesters who sell their raw material directly to consumers based on informal, verbal agreements. The material traded is often low in quantity compared to the other commercialisation approaches. Harvesters are mainly unorganised, and their harvesting methods employed are largely unknown.

Biotrade, on the other hand, involves a much longer value chain, involving a variety of actors ranging from the producer to the consumer (Figure 1). Wynberg (2006) described similar approaches that relate to this form of trade, such as the "honest broker model "and the "NGO model". In the honest broker model, NGOs support harvesters to organise themselves and to employ sustainable harvesting practices and link these harvesters with buyers. Shiferaw et al. (2011) highlights that establishing collector organisations is often instigated by outside agents such as NGOs. The NGO model also closely relates to biotrade in that NGOs facilitate the commercialisation process by purchasing raw material from harvesters and selling it directly to buyers. The material traded is typically of a higher quality and volumes are much larger than those produced by informal trade activities. Biotrade activities usually involve simple processing techniques before the final product enters into the market.

The last commercialisation approach, called bioprospecting, is very different from informal trade and biotrade in that the genetic material from biological resources is used for commercial purposes. Intensive research and development is carried out to identify genetic material that has actual or potential use or value. Therefore, parts of a biological resource are used for their genes, biochemical compounds, or derivatives. In this approach, private companies purchase raw material from harvesters and have the necessary financial capacity to invest in product development activities. Bioprospecting commercialisation approaches often involve formal, written agreements between harvesters and buyers to ensure the equitable sharing of benefits derived from the use of the genetic material. Private companies that take this approach often target specific consumer niches to develop and adapt products that contain unique attributes (Sáenz and Serrato, 2016). The extraction of unique compounds from the resurrection bush for anti-aging purposes, for example, falls into the bioprospecting category.

This chapter aims to uncover the different access and regulatory requirements, benefit-sharing strategies, and environmental implications associated with each approach to the commercialisation of the resurrection bush. As it has already been shown, in different countries, different laws are adopted for natural resource commercialisation, some having negative consequences for harvesters and economic growth. To a large extent, national laws influence the benefits harvesters receive from the commercialisation of the resurrection bush. This directly impacts on the sustainability and conservation of the species.

9.2 Access and regulatory requirements

Each of the resurrection bush commercialisation approaches have a different set of regulatory requirements. These have been implemented in different ways, resulting in a variety of outcomes. This research has shown that all harvesting activities associated with the resurrection bush takes place on communal land, and therefore different levels of control and access are exercised based on the commercial activity being employed (informal or formal), the use of the resource (biological or genetic), and the national regulatory requirements implemented for natural resource commercialisation. As it has previously been established, the informal trade of the resurrection bush is predominantly unregulated. Due to a lack of local-level governance and control over natural resource use in some areas, access to harvest the resurrection bush is also largely uncontrolled. Biotrade and bioprospecting commercialisation activities, however, require more formalised processes to access and commercialise the resurrection bush, requiring prior informed consent and permit applications from the state.

According to Ribot and Peluso (2003), access in this context is defined as the ability to benefit from natural resources. However, different people and institutions control resource access and others maintain their access through those who have control (Ribot and Peluso, 2003). In southern Africa, the state is the legal owner of communal land (Adams et al., 1999). However, traditional authorities make decisions and have authority over land use and allocation. Therefore, for biotrade and bioprospecting commercialisation approaches associated with the resurrection bush, access to harvest the species for commercial purposes on communal land requires consent from traditional authorities. Local communities on communal land are only allocated user rights over land. Therefore, they are granted power over how land is managed and utilized (Moyo, 2005). Marula fruit harvesters in South Africa

and Namibia provide an example of this (Wynberg et al., 2003). The main source of marula fruit is sourced from communal land, where ownership is vested in the state. As a result, communities are granted user rights but do not have secure land tenure rights. The possible threat of this is that it can lead to increased competition for marula used for subsistence purposes and the fruit needed for commercialisation (Wynberg et al., 2003). Similarly, for the resurrection bush, insecure land tenure rights on communal land can result in increased community conflict between those using the species for traditional purposes and those who harvest for commercialisation.

The regulation of biotrade and bioprospecting activities differs from one country to the next, exhibiting significant challenges for industries. In Namibia and Zimbabwe, access to the resurrection bush for biotrade commercialisation activities requires Prior Informed Consent (PIC) from government officials. Once granted, a permit is issued and commercialisation activities can commence. Gaining access to the resurrection bush for bioprospecting commercialisation activities, however, is significantly different. In such instances, once PIC has been granted, a Benefit-Sharing Agreement (BSA) must be negotiated with harvesters to ensure the development of Mutually Agreed Terms (MATs). Only once these procedures have been followed and approved by national government, can commercialisation take place. In South Africa, on the other hand, a blanket approach has been adopted for regulating biotrade and bioprospecting commercialisation approaches. Here, access to the resurrection bush for biotrade and bioprospecting commercialisation require similar processes and procedures. PIC needs to be obtained from local communities, and a material transfer agreement must be developed. In addition, a BSA based on MATs must be negotiated. These procedures are required for both biotrade and bioprospecting activities in South Africa.

According to Wynberg (2017), there is only a need to regulate biotrade activities under particular circumstances where volumes are large, and where overexploitation is a concern. As it has already been noted, the regulation of biotrade commercialisation activities should require measures that are significantly different to bioprospecting (Wynberg, 2017). The scope of the CBD and Nagoya Protocol applies to genetic resources, excluding biotrade activities (biological resources) from ABS regulatory requirements. However, in South Africa, applying the same regulatory frameworks to both biotrade and bioprospecting activities has raised inherent challenges. EcoProducts (a company based in South Africa), for example, sourced un-cracked baobab fruit from communal areas in Limpopo. The company

extracted a powder and oil from the fruit and sold it to companies or retailers for use in value-added products. EcoProducts obtained a bioprospecting permit from the Department of Environmental Affairs, however those purchasing baobab from the company were still required to obtain additional permits at each point of the value chain (Wynberg and Laird, 2014). These additional permits were required even though the raw material was not being used for research and development purposes.

As a result of the added complexity and unworkable ABS regulatory framework in South Africa, companies seek to access raw material from countries with more favourable regulatory frameworks, such as Namibia. This approach is referred to as regulatory "forum shopping". According to Meinzen-Dick and Pradhan (2002), forum shopping occurs when an individual supports a particular legal framework because they feel it best suits their situation. This is particularly prominent in South Africa, such "forum shopping" could have negative economic, social, and environmental consequences for the country (Wynberg and Laird, 2014).

This research has shown that informal trade activities associated with the resurrection bush are unregulated and that sustainable harvesting and conservation efforts are largely unknown. Due to the lack of local-level control over the harvesting of the resurrection bush in South Africa, some biotrade and bioprospecting activities are taking place under informal trade activities because of regulatory constraints. Such activities are a result of the national ABS legislation which conflates biotrade and bioprospecting activities. However, it is important to note that sourcing raw material from informal traders for either biotrade or bioprospecting still requires a bioprospecting permit. The informal trade of raw material is exempt from the national Bioprospecting, Access and Benefit Sharing legislation but the purchase therefrom for commercialisation is not.

Figure 32 depicts the distinctions and overlaps between informal trade, biotrade, and bioprospecting. The illustration highlights the importance of regulating informal trade activities and adopting separate regulatory approaches for biotrade and bioprospecting activities. The informal trade of raw material provides harvesters with direct cash income from commercialisation. This form of trade takes place between harvesters and buyers where resource quantity is often low. Once volumes increase and the resource is sold in commercial markets, the trade moves from being informal to biotrade. This is when large volumes of raw

material are sold to commercial entities who undertake a certain degree of value addition. Along this value chain, each actor in the process receives benefits (mainly monetary) until the final product reaches the consumer. If a commercial entity sources raw material to identify new sources of compounds, genes, or products that could have potential economic value, the approach moves from biotrade to bioprospecting. Under this approach, benefits can originate from conducting research on genetic resources to determine if there is any potential for resource development. Another benefit can derive from the royalties obtained from commercialising and patenting a genetic resource that has undergone extensive research and development. The products manufactured from bioprospecting activities are usually developed for specialised, niche markets. It is evident that each of the three commercialisation activities has a different suite of elements which make them distinct. As a result, the benefits obtained, the quality requirements expected, the conservation measure employed, and the regulatory requirements enforced are typically different from one approach to another.

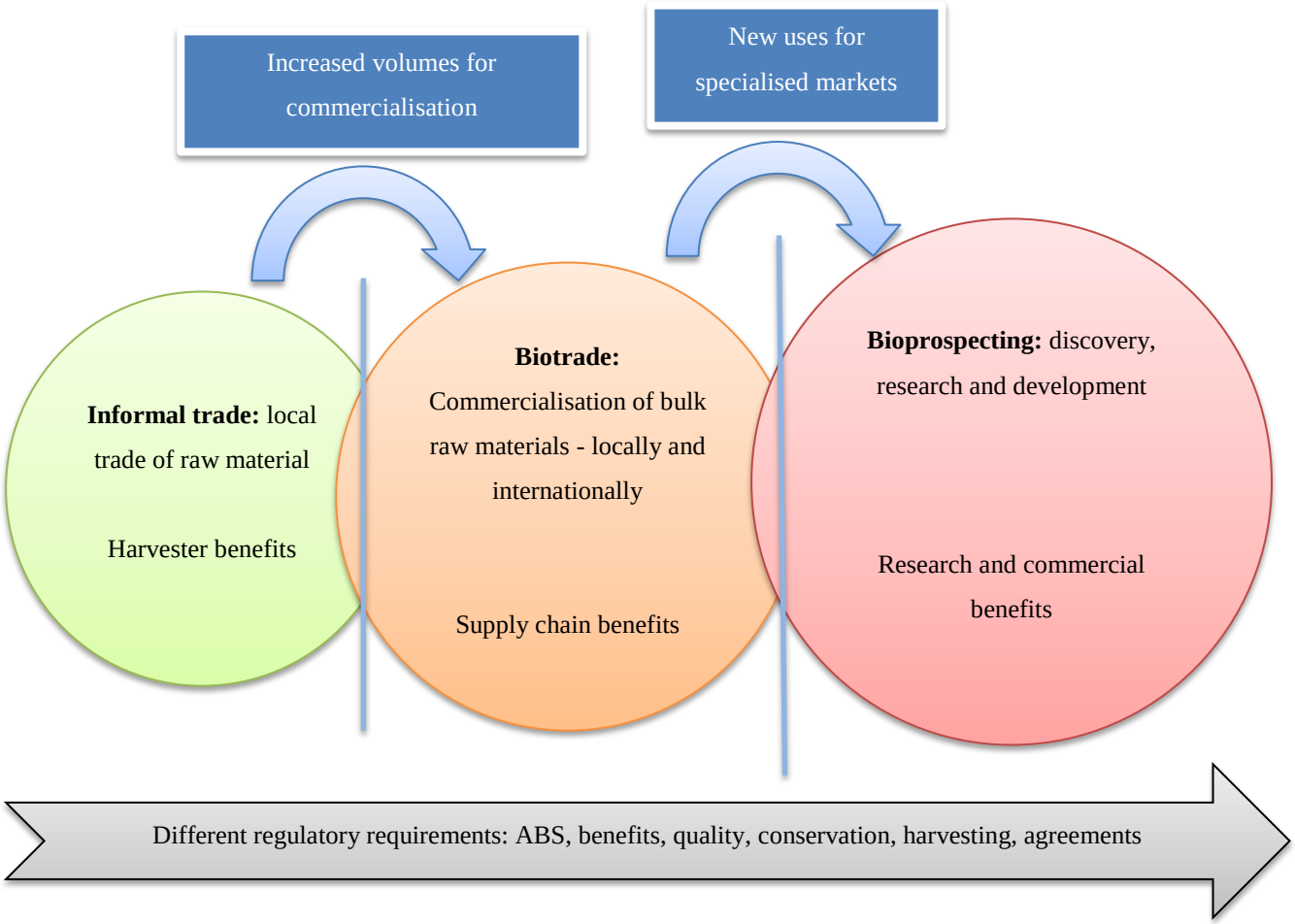


Figure 32: Distinctions and overlaps between informal trade, biotrade and bioprospecting (Adapted from Wynberg, 2017).

9.3 Benefits

Across all three commercialisation approaches, the harvesters of the resurrection bush benefit mainly from direct cash payments for the raw material. In each approach, commercialisation begins with obtaining the raw material from the harvesters, thus providing local communities with a direct cash income. However, the question that remains is whether this is sufficient to contribute to poverty alleviation and equitable trade. As described in Chapter 2, NTFP commercialisation is expected to increase income opportunities and contribute to the alleviation of poverty among the most marginalised sectors of society (Marshall and Newton, 2003; Shackleton and Shackleton, 2004; Belcher and Schreckenberg, 2007). The commercialisation of NTFPs is therefore largely seen as an engine through which rural growth and development can take place. However, this research has revealed that this does not always transpire in practice. It was found that particularly among bioprospecting commercialisation approaches, a large gap exists between the amount paid to harvesters for raw material and the retail price of the final product.

Namibia is an example of a country where ABS regulatory requirements have already been implemented and enforced, demonstrating the range of benefits derived along the resurrection bush value chain. However, concerns have emerged regarding the disparity between the amount harvesters receive for raw material and the price of the final product. Particularly in the cosmetics industry, the price of the end product is largely determined by competitor pricing, which often entails significant profit margins. Belcher and Kusters (2004) highlight that the price of the final product, as compared to what harvesters receive for the raw material, is exploitative and unfair. According to Shackleton (2005), this is often because of the 'survivalist' nature of traders which forces harvesters to be price-takers. Harvesters of NTFPs furthermore often have little knowledge of where their produce goes to, what it is used for, and what prices are paid along the value chain (Belcher and Schreckenberg, 2007).

A study conducted in Nepal on the commercialisation of the *lapsi* tree (*Choerospondias axillaris*) fruit found that majority of the benefits derived from the fruit were realised by actors other than harvesters (Gautam, 2004). For example, the production of candy made from 12 kilograms of the *lapsi* tree fruit showed that producers sold the fruit for US$ 0.75 (± R10.50), a local producer sold 10 kilograms of candy for US$16.40 (± R230.00), and a local trader sold the 10 kilograms of candy (divided into 200-gram packets) for US$55 (± R773).

The commercialisation of devil's claw (*Harpagophytum* spp.) in Namibia is a similar example of this. Devil's claw is mainly exported overseas in an unrefined state for further processing (Cole and du Plessis, 2001). The value chain of devil's claw involves a few companies producing extracts from the raw material. It was established by Cole and du Plessis (2001) that Namibia captures 1% of the value of the trade in devil's claw extracts with harvesters receiving no more than 0.5%. After retail mark-ups, packaging, marketing, and processing costs are deducted, processors and formulators make significant profits at the expense of the poor (Cole and du Plessis, 2001). In another example, raw devil's claw material used for the herbal tea market is sold in German pharmacies for 20 times its import price, which is approximately 40 times more than what harvesters receive (Cole and du Plessis, 2001).

Bioprospecting activities are intended to provide additional benefits to collectors – both monetary and non-monetary – which are negotiated and agreed upon on a case-by-case basis. The ABS agreement between a company in France called MANE and a harvester group in Cameroon is an example of an instance where both monetary and non-monetary benefits are provided (UNCTAD, 2017). MANE exports the dried roots of *Echinops giganteus* from Cameroon to develop an extract and pays a fixed price per kilogram of raw material to harvesters (UNCTAD, 2017). A 25% profit share from the *Echinops giganteus* products is also deposited into a community trust fund to be used for the benefit of the harvester community in Cameroon (UNCTAD, 2017). MANE also provides non-monetary benefits such as educating communities on good cultivation and sourcing practices, as well as scholarship grants for local students (UNCTAD, 2017). In the case of this research, it has been shown that most of the value addition activities associated with the resurrection bush take place outside of the area from where the resource was harvested. The non-monetary benefits from value addition are thus limited, reducing the potential for provider countries to maximise on the benefits of the commercialisation activities involving the resurrection bush.

According to Handa (2008), medicinal and aromatic plants are often purchased from developing countries to further add value in developed countries which are then sold at higher prices. A strong motivation behind the CBD and Nagoya Protocol is that benefits derived from the utilisation of genetic resources and/or associated traditional knowledge should help provider countries develop their own sustainable uses of genetic resources (Kamau et al., 2010). Although, local communities mainly benefit from the monetary returns for the raw

material, non-monetary benefits – such as participation in product development and the transfer of knowledge and technology – do not benefit the people or country where the resurrection bush was sourced.

9.3.1 Producer organisations

This research suggests that harvester organisations have become more formalised as the trade has become more specialised. Informal trade activities associated with the resurrection bush are typically carried out by an individual harvester. By contrast, some biotrade and bioprospecting commercialisation approaches involve harvesters who are affiliated with producer organisations. This research has revealed the importance of developing such harvester organisations or associations when commercialising the resurrection bush by noting the potential for increased harvester benefits as a result. Such findings are supported by Belcher and Schreckenberg (2007), who highlight the importance of developing associations or organisations because they allow for the pooling of produce to meet order requirements; sharing the costs and benefits of collective investments in storage, processing, and transportation; and improved bargaining power through collective negotiation. Referring to a study conducted amongst pita *(Aechmea magdalenae)* traders in Oaxaca, Mexico, Marshall et al. (2006) demonstrate how levels of organisation can have a significant influence on the benefits that collectors can receive. Although poorly organised individual traders completely stopped harvesting pits when buyers were no longer interested, harvesters who had developed a co-operative were able to negotiate guaranteed producer prices, despite the decrease in demand (Marshal et al., 2006). This is an example of the kind of economic activities that Shiferaw et al. (2011: 10) have described as "one of the greatest incentives for collective action in producer organisations."

Further pointing to the benefits that organisations can offer individual collectors, Shackleton (2005) notes that unlike organisations, individual collectors often do not have the technology, resources and skills required to expand their commercialisation activities. Strengthening local organisations is therefore likely to grow this capacity and thus have a positive impact on poverty alleviation in rural areas. The research conducted in this study on the commercialisation of the resurrection bush has shown that harvesters who have developed organisations are favoured by commercial entities because they have already established the necessary benefit-sharing mechanisms through which commercialisation can take place. For

example, in Zimbabwe, an association called the Indigenous Tea Company Zimbabwe (ITCZ) consists of over 300 harvesters who supply resurrection bush for the tea market. All material that is sold through the ITCZ is equitably distributed between the harvesters of the association. In contrast, where harvesters have not set up producer organisations, only small quantities of raw material are requested at irregular intervals.

Through collective action, harvesters can generate significantly higher benefits, as private companies prefer to work with organised groups to ensure a reliable supply of quality produce. This research affirms this finding, where resurrection bush harvesters have developed organisations or associations and have received increased benefits because of this. For example, in Namibia, the establishment of the Kunene Conservancies Indigenous Natural Products (KCINP) Trust has attracted commercial partners (such as Intiki) to undertake the commercial activities associated with the resurrection bush. Harvesters receive a fixed price per kilogram of the raw material and will receive additional benefits from the percentage share of the final product. In Uganda, Nando's (the franchised fast-food outlet), would purchase mixed-quality potatoes from the open market. The establishment of a Ugandan producer group called the Nyabyumba Farmer Group, however, attracted Nando's to form an agreement with them to purchase a continuous supply of quality potatoes from a single source (Kaganzi et al., 2009). Due to the quality and quantity requirements of the private sector, companies often promote and support producer organisations to meet increasing demands and specified quality standards. In Vietnam, for example, a company called Traphaco SaPa sources and processes natural ingredients from the Traphaco Group, the largest traditional medicine producer in the country. Traphaco SaPa has established mechanisms to build direct contact with collector groups, providing support for the development of formal harvester organisations, technical training, and capacity building (UNCTAD, 2017).

As this research has shown, the majority of the formal resurrection bush commercialisation activities take place in conjunction with producer groups who have organised themselves and established associations or recognised organisations. Examples of this include the KCINP Trust in Namibia, Marula Zimbabwe and the ITCZ in Zimbabwe. This is often preferable to NGOs and private companies because harvesters are then easier to work with, the quality of raw material is guaranteed, the supply of varied volumes throughout the year is reliable, and formal agreements can be negotiated in a fair and equitable manner. Biotrade and bioprospecting commercialisation activities characterise this approach, allowing for the

establishment of relationships with organised harvesters and buyers where transactions are regulated and prior agreements are required.

9.3.2 Use of traditional knowledge and compensation

The findings of this research show that the informal trade of the resurrection bush is based upon traditional knowledge of indigenous local communities. As described in Chapter 2, traditional knowledge can provide leads to interesting properties from genetic resources (Greiber et al., 2012). The CBD and Nagoya Protocol have provisions which value and protect traditional knowledge to ensure that local communities receive fair and equitable compensation for the use of genetic resources and their associated traditional knowledge (CBD, 2010b). Therefore, industries that utilise traditional knowledge to develop products should compensate traditional knowledge holders for their innovations. The majority of the biotrade commercialisation companies described in this research utilise traditional knowledge for commercial purposes yet most of these companies have not compensated indigenous local communities for the use of their knowledge. For example, the commercialisation of resurrection bush tea in Zimbabwe falls under biotrade but is subject to ABS regulatory requirements because of the traditional knowledge associated with it. However, some companies have not entered into benefit-sharing agreements with local communities. Furthermore, the use of the resurrection bush for colds and flu has traditional origins and therefore requires benefit-sharing agreements with traditional knowledge holders in Zimbabwe. The lack of knowledge associated with the ABS regulatory requirements among commercial entities in Zimbabwe appears to be a key factor preventing equitable benefit sharing.

Wynberg (2017) points to a larger underlying issue with regards to compensating traditional knowledge holders for their innovations and practices, explaining that there are inherent difficulties with identifying traditional knowledge holders and finding representative communities to negotiate ABS agreements with. This view is shared by Greiber et al. (2012), who highlight that practical problems may arise when the ownership of traditional knowledge is unknown or unidentifiable. In South Africa, for example, the indigenous San and Khoi claim to be the traditional knowledge holders of the resurrection bush, rooibos, honeybush, and a variety of other species (Zuplex, 2016). Benefit-sharing agreements have been negotiated with the National Khoi and San Council (NKSC) to compensate for their

knowledge. With regards to rooibos in particular, however, there is much scepticism by industry representatives as to whether the San and Khoi are in fact the traditional knowledge holders of the species, as evidence of such is inconclusive (Wynberg, 2017). This research has uncovered similar difficulties with regards to the resurrection bush, where identifying traditional knowledge holders has been challenging. This difficulty is most poignantly demonstrated in an example from Zimbabwe, where although the resurrection bush is used traditionally throughout the country, benefit-sharing agreements are only being developed with harvesters of the resurrection bush in Chivi district but not with Domboshava harvesters. This is due to a lack of documentation of traditional knowledge associated with the species among communities in different parts of the country.

Another concern is that genetic resources often extend beyond national borders, making it challenging to identify and compensate all traditional knowledge holders. In other words, as Greiber et al. (2012) explain, genetic resources and associated traditional knowledge are often not confined to a specific country or held by one indigenous local community. The resurrection bush is a shared resource and has been used by a number of different communities for decades. Because the resurrection bush is found across a number of southern African borders, it is difficult to know which country – let alone which community – should be credited for the traditional knowledge associated with the plant. (KI 4, 19 October 2017, Namibia). Adequately identifying traditional knowledge holders is therefore particularly challenging for transboundary species such as the resurrection bush. National government in South Africa consider the community owners of Muthi Futhi to be the traditional knowledge holders of the resurrection bush. However, there is a lack of evidence to prove that they are, in fact, the initial knowledge holders, given that the species is so widespread and is commonly used by a diversity of indigenous communities across southern Africa. It is useful to look at other species where traditional knowledge and biological resources cross multiple borders. In Vietnam, a similar difficulty exists where the compensation for the traditional knowledge associated with *Ampelopsis cantoniensis*, a vine, has been overlooked due to the fact that such knowledge is widely used, known, and shared. This makes it difficult to discern who the legitimate traditional knowledge holders of the species are and who the potential recipients of the benefits of that knowledge should be (UNCTAD, 2017).

The African cherry tree (*Prunus africana*), presents a similar difficulty. Prevalent in the African highlands, the use of the species in traditional medicine spans across its range – from

South Africa to Cameroon (Stewart, 2003). The traditional knowledge associated with the medicinal use of the species therefore extends beyond multiple country borders and is held by a variety of different communities (Greiber et al., 2012). In such cases where genetic resources and traditional knowledge cross national boundaries, Article 11 of the Nagoya Protocol encourages regional cooperation. Such cooperation could provide a solution to the aforementioned challenges and offer greater equity and justice for indigenous communities across southern Africa. As one respondent explained, "developing transboundary cooperation for many people is the way to go – you share, you recognise and in principle you equally distribute all the benefits" (KI 5, 20 October 2017, Namibia).

The Zimbabwe/Mozambique/Zambia Transboundary Natural Resource Management Area (ZIMOZA) is a formalised example of such transboundary cooperation. Local communities from all three countries share cultural and historical ties within an area rich in natural resources (Dhliwayo, 2002). The initiative is aimed at improving the sharing, exchange, and management of resources and tradable goods among communities in the area (Katerere et al., 2001). It is in so doing, that the initiative hopes to unlock a wealth of opportunities for the benefit of communities and their respective nations (Dhliwayo, 2002). A draft Memorandum of Understanding (MOU) was compiled to make provisions for the ministerial, technical, and local area committees to drive the ZIMOZA process. Through this, provisions were also instilled for the establishment of a Transboundary Natural Resource Management Fund, where members of the technical committee would be trustees (Jones and Chonguiça, 2001). The technical committee is therefore responsible for approving commercial activities which can then be equitably distributed via the fund.

According to Katerere et al. (2001: 13), one of the main objectives of transboundary cooperation is to "optimise regional distribution of benefits from resource use". The establishment of transboundary cooperation is important because national governments often have the authority to regulate resource use within their own borders but do not have such control across borders (Katerere et al., 2001). Therefore, local communities must be involved in the formation of policies and laws regulating access to and utilisation of natural resources shared by the three indigenous local communities to avoid resource mismanagement (Dhliwayo, 2002).

It is evident that compensating traditional knowledge holders for their innovations and creativity associated with biological and genetic resource is challenging, especially for cross border species such like the resurrection bush. With the lack of adequate historical records, identifying knowledge holders will remain unattainable and commercialization will continue to circumvent equitable benefit sharing. Therefore developing transboundary cooperation will promote collective action among nation states to equitably recognise and distribute benefits associated with cross border species. Developing and harnessing harmonisation and co-operation between countries and associated communities, will facilitate the sharing, exchange and management of commercial resources.

9.4 Cultivation and environmental sustainability

The resurrection bush is harvested from the wild for all informal trade activities. Due to sustainability concerns, the resurrection bush has been cultivated for bioprospecting and biotrade commercialisation approaches, but the species is still collected from the wild in large quantities. As described in Chapter 2, because the resurrection bush is such a slow-growing species, cultivation may not provide a steady and sustainable solution to meet increasing demands (Douie et al., n.d.). Cultivating the resurrection bush may also reduce harvester benefits as the trade moves from the communities to private entities. Therefore, even though cultivation can relieve pressure from wild resources, it does not address challenges of equity and justice among harvesters. Similar challenges have been recorded for other species. For example, the commercial cultivation of *Pelargonium sidoides* in South Africa has resulted in elite capture of monetary and non-monetary benefits (van Niekerk and Wynberg, 2012). Once the demand for a species increases, cultivation is seen as an attractive solution to meet industry pressures. However, this shifts the trade to new beneficiaries such as private companies or organisations and away from local communities. This is evident in the cultivation of the resurrection bush, where a private company has successfully propagated the species and sells the raw material across the globe. This has removed all community involvement in the resurrection bush value chain, instead providing benefits for one individual.

Figure 33 shows a cycle of produce extraction and the point where cultivation activities are employed and community benefits are potentially lost. In the expansion phase, there is a clear increase in harvesting activities by local communities. The stabilisation phase occurs when an

equilibrium is reached between the supply and demand of a product – where the maximum capacity of extraction is eminent (Homma, 1992). Although at this point, harvesting is still carried out by collectors, cultivation measures soon begin to prevent the species from moving into the decline phase. In the decline phase, there is a decrease in the resource base and an increase in the cost of the harvested raw material. As a result, the quality and quantity of the resource is significantly reduced.

Cultivation requires significant inputs – such as seedlings, fertiliser, water and land – which rural communities do not have access to without significant subsidisation and external support. According to van Niekerk and Wynberg (2012), this finding is common for many NTFPs traded across the globe. Benefits are therefore captured by those that have the land, capital, and capacity to partake in cultivation activities (van Niekerk and Wynberg, 2012). The cultivation of the resurrection bush in South Africa is the result of extensive research and capital investments which were used to successfully propagate the species and establish suitable cultivation sites. The lack of human, financial, and physical capital among local communities in rural areas impedes resurrection bush harvesters from establishing cultivation plants.

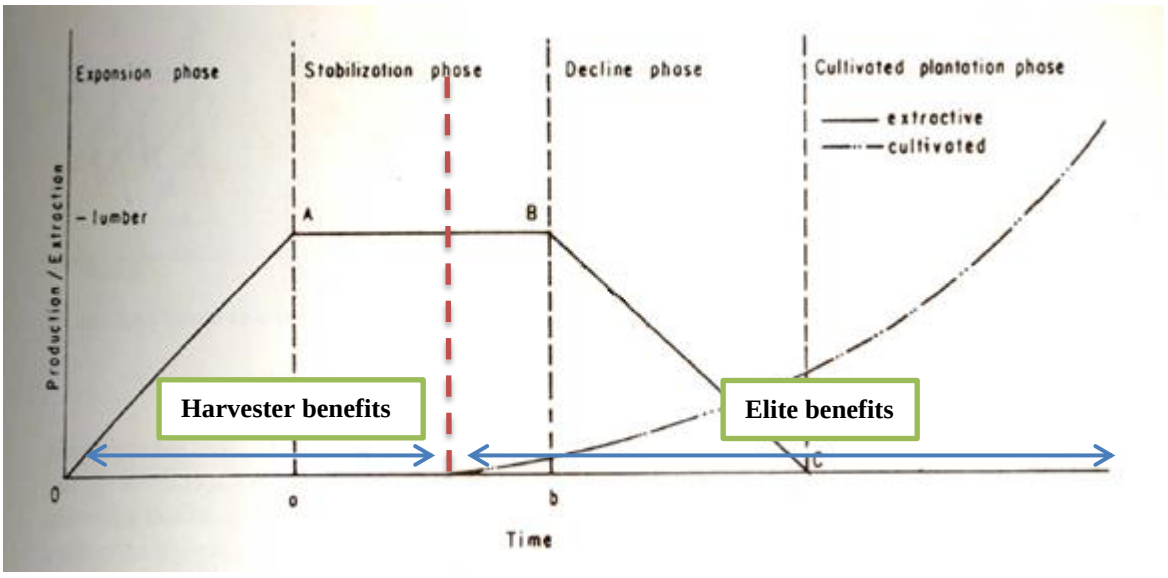


Figure 33: The cycle of forest product extraction and the benefits received (Adapted from Homma, 1992).

Another possible challenge associated with cultivating the resurrection bush is that the active ingredient may no longer be prominent in the cultivated supply. Schneider et al. (2006)

conducted a study which found that when devil's claw was cultivated to meet increasing demands, a lower percentage of the active ingredient was present than in tubers grown in the wild. Harpagoside is the active ingredient found in the root tubers of devil's claw. This active ingredient has been reported to show anti-inflammatory, anti-rheumatic, and analgesic activities (Park, 2016). To maintain a reliable and sustainable supply of devil's claw, cultivation trials were adopted, using a variety of different methodologies. It was found that the irrigated cultivation of devil's claw species showed a significantly lower content of harpagoside than wild growing plants (Schneider et al., 2006). Even though devil's claw is a different species, important lessons have emerged from this case about the possible challenges involved in cultivating valuable plant species. While this might not hold true for the resurrection bush, it does suggest the need for detailed research to ascertain whether cultivation is a viable solution to increasing consumer demands. Based on resource inventories, however, there is an apparent abundance of the resurrection bush across southern Africa, making wild harvesting the most attractive solution to meet current resurrection bush demands. However, if the demand for this resource increases, the wild resource base will be under significant pressure, and this could have detrimental impacts on the survival rate of the resurrection bush.

9.4.1 Sustainable harvesting

Over and above the ecological concerns associated with commercialising the resurrection bush, there are inherent challenges with harvesting the species sustainably. As explained in Chapter 2, NTFPs as a development strategy became popular due to the notion that the sustainable harvesting of NTFPs has less ecologically destructive outcomes than timber harvesting, therefore providing a platform for sustainable forest management and livelihood enhancement (Arnold and Pérez 2001; Marshall and Newton 2003; Ticktin 2004; Shahabuddin and Prasad 2004). For informal trade commercialisation activities in particular, the quantities of resurrection bush harvested, and the methods employed are unregulated and therefore largely unknown. Some companies have resorted to sourcing the resurrection bush from informal traders to bypass regulatory hurdles, putting increased pressure on the wild resource. Without effective monitoring of informal trade activities, the resurrection bush will remain exploited and offtake will continue uncontrolled. In addition, the limited knowledge and capacity of informal traders to harvest sustainably exhibits additional challenges to address resource mismanagement on communal land. Likewise for some biotrade

commercialisation approaches, the harvesting of the resurrection bush takes place independently, by private companies, for commercial ends. These activities are similarly not monitored, and therefore sustainability cannot be guaranteed. Having said this, a large majority of biotrade and bioprospecting commercialisation approaches operate in conjunction with significant NGO support, where sustainable harvesting measures are prescribed and monitored. As described in Chapter 2, the role of NGOs in the commercialisation of natural resources is largely attributed to training harvesters on how to sustainably collect commercially valuable resources. According to Neumann and Hirsch (2000), the success of community-based management projects is mostly due to NGO intervention, where communities are given technical support to ensure forest management practices are sustainable. This research has revealed that resurrection bush harvesters across the study sites in Namibia and Zimbabwe, who work closely with NGOs, employed sustainable harvesting practices. None of the harvesters demonstrated or expressed destructive harvesting methods, strictly following the sustainable harvesting guidelines prescribed within their organisational structures. In such cases, the economic gain from NTFP commercialisation seems to promote the ecological sustainability of the resurrection bush. Current consumer demands for the resurrection bush are, however, minor in comparison to the supply. Thus, it cannot be guaranteed that the resource base will be preserved if demands increase.

9.4.2 Conservation

The economic gain from the commercialisation of NTFPs was initially intended to provide an incentive to conserve natural resources (Murali et al., 1996; Arnold and Pérez 2001; Dovie 2003; te Velde et al., 2006; Avocèvou-Ayisso et al., 2009; Hernández-Barrios et al., 2014). Indeed, one of the aims of the CBD is to promote conservation and the sustainable use of biodiversity through the fair and equitable sharing of benefits that arise from the utilisation of genetic resources (Richerzhagen, 2014). Although efforts have been put in place to support the sustainable harvesting of the resurrection bush, there is little evidence to show that long-term conservation strategies are being enforced for all commercialisation approaches associated with the resurrection bush. In Zimbabwe, cultivation trials are being explored; however, this potentially reduces the pressure on the wild harvested resurrection bush rather than contributing to the overall conservation of the species. In Namibia, even though there is an abundance of the resource, there is still a potential concern for the local extinction of the species amongst communities. These examples demonstrate how, as Greiber et al. (2012:

125) have explained, “there is often little consideration of how decisions and policies on ABS may effectively provide incentives for conservation and sustainable use”.

Costa Rica is an example of a country that has been a pioneer in developing a comprehensive biodiversity law in response to the CBD, particularly with regards to conservation efforts. The country has dedicated 25% of their national territory to conservation (Richerzhagen and Holm-Mueller, 2005). In addition, the National Institute for Biodiversity was established to coordinate all activities associated with biological diversity and to promote conservation and economic development in the country. Monetary benefits arising from bioprospecting activities are shared with The Ministry of Natural Resources and Energy and Mines. The ministry is allocated 10% of the research budgets and 50% of any further royalties or milestone payments from bioprospecting contracts that are reinvested into the area of conservation (Richerzhagen and Holm-Mueller, 2005). Similarly in Cameroon, efforts have been adopted to support the long-term conservation of *Echinops giganteus*. Due to the increased commercialisation of *Echinops giganteus*, an ABS project was established to support local institutions and their capacity for the sustainable management of the species and restoration of the landscape in which it occurs. As a result of the project, over 200 people received training on the sustainable management of *Echinops giganteus*, agroforestry, and ABS (UNCTAD, 2017).

The examples discussed above demonstrate that in order for the commercialisation of the resurrection bush to be successful in the future, efforts need to be implemented for the long-term protection of the species in order to ensure that harvesters continue to reap sustainable benefits. The conservation of biodiversity is a large component of the CBD and Nagoya Protocol. Even though Namibia, Zimbabwe and South Africa have included conservation components in their national ABS regulatory frameworks, there is very little practical evidence to support that the resurrection bush is in fact, being adequately conserved on the ground. Therefore it should be mandatory that all ABS agreements include conservation efforts, regardless of the abundance of the resource. This research has shown that the resurrection bush is a very slow growing species and that cultivation may not serve as a viable solution to increasing demands. Thus, conservation of the species is imperative granted that commercialization activities persist to rely on the wild resource base.

9.5 Conclusion

This research has revealed that majority of the resurrection bush commercialisation approaches rely on wild harvested material to meet current demands. If such demands increase, the wild resource may not withstand the added pressures. With the numerous downfalls of cultivation, effective long-term conservation efforts need to be implemented, monitored and managed. The establishment of formal producer organisations can provide a platform for improved bargaining power, equity, and resource sustainability and conservation among harvester groups. However, national regulatory requirements largely influence the range of benefits harvesters can receive from natural resource commercialisation. Enforcing legislation that hinders national and local benefits contradicts what the CBD and Nagoya Protocol intended to achieve. Provider countries should receive maximum benefits from commercialisation with the aid of national policies and protocols. In addition, traditional knowledge holders should be recognised and remunerated in an equitable manner, although determining which parties should be compensated has shown to be challenging.

10. Chapter 10 - Conclusions and Recommendations

The overall aim of this study was to uncover and understand the ways in which benefit sharing and environmental sustainability is interpreted and implemented across the different resurrection bush commercialisation approaches used in Zimbabwe, Namibia and South Africa. This was examined to determine the different suite of benefits each approach yields for local livelihoods and biodiversity conservation in order to inform current and future commercialisation approaches. To achieve this aim, six objectives were set out. First, an in-depth review of the historical and traditional use of the resurrection bush was described. Second, the different ways in which the resurrection bush was commercialised and the processes followed were explained. Third, the actors and their roles within each commercialisation approach were examined. Fourth, the ways in which commercial actors gain access to the resurrection bush within each commercialisation approach were explored. Fifth, the range of benefits derived from each commercialisation approach were analysed. Lastly, the policy implications and practical applications of current resurrection bush commercialisation approaches were assessed.

Emerging from this research, a series of conclusions are drawn. The inadequate implementation of regulatory frameworks which support natural resource commercialisation has negatively impacted harvesters and overall economic growth. Although the commercialisation of the resurrection bush can generate significant benefits for local communities, elite capture dominates. Traditional knowledge holders are not adequately compensated and acknowledged for their innovations and practices due to the absence of sufficient historical records and transboundary cooperation. The sustainable harvesting of the resurrection bush has mostly been enforced, however long-term conservation efforts across all commercialisation approaches are lacking. The following section will conclude on the regulatory requirements adopted in Namibia, Zimbabwe and South Africa, highlighting the need for distinct regulations associated with each commercialization approach.

10.1 Regulatory requirements are either absent or too restrictive

The informal trade of the resurrection bush continues without regulation. Without local-level control and monitoring, the risk of unsustainable harvesting and overexploitation of the resurrection bush will perpetuate. More formal commercialisation approaches such as biotrade and bioprospecting, however, require formal consent and commercial agreements. In

this way, there is more active government involvement in regulating access to the resurrection bush. Land ownership is vested in the state and therefore all commercialisation activities that take place on communal land should be documented and approved by government. The longer informal trade activities are unregulated, the more commercial entities will utilise informal traders for commercial outputs, bypassing strict regulatory requirements. In order to promote compliance and restrict illegal activities, regulations around natural resource commercialisation need to be streamlined and transparent. Informal trade, biotrade, and bioprospecting are inherently different commercialisation approaches, each aiming to deliver significantly diverse commercial outputs. As a result, the regulatory requirements enforced for each commercialisation activity should follow a separate set of procedures and processes to obtain compliance. Without this, like is the case in South Africa, commercial entities will source raw material from countries that have the appropriate legislation in place to support the commercialisation of the resurrection bush. Although there is ABS legislation in place in Zimbabwe which sounds promising on paper, in practice no one knows how to implement it or deal with it correctly. As a result, the commercialisation of the resurrection bush has taken place unlawfully. NGOs, rather than government, are currently driving ABS in the country by adopting and implementing adequate procedures to facilitate the process. Although Namibia appointed a bioprospecting committee, this has largely failed to raise awareness and provide support for bioprospecting activities. The country has since adopted national legislation which provides clarity and transparency for biotrade and bioprospecting commercialisation activities, but it is too early to establish the effectiveness of these laws. The following section will conclude on the benefits resurrection bush harvesters receive and the factors that reduce economic upliftment among rural harvester communities.

10.2 Local benefits are potentially significant but are not optimised

A range of benefits have resulted from the commercialisation of the resurrection bush. The informal trade of the species has provided harvesters with direct cash income. Biotrade commercialisation activities have also generated additional income opportunities for harvesters. The price paid for raw material, however, differs significantly across the study sites and within the study areas. The majority of biotrade activities take place in Zimbabwe, where the resurrection bush is sourced from a variety of different locations. Price negotiations are common in Zimbabwe and therefore the price harvesters receive for raw material is rarely fixed. A more pressing challenge in Zimbabwe is that some companies harvest the

resurrection bush from nearby mountains, excluding harvesters from potential benefit-sharing opportunities. Most often, small companies are unaware of the necessary procedures involved in harvesting natural resources. The cultivation of the resurrection bush in South Africa similarly hinders local economic development and livelihood improvement, shifting the trade of the resurrection bush to those that have the land, capital, and capacity to undertake cultivation activities. Commercialisation activities can, however, provide income opportunities for harvesters. In some cases, this is twofold – the harvesters may receive income from the sale of raw material as well as a percentage share from the sales price of the final product. With value-addition activities taking place outside of where the resource was harvested, however, local communities miss out on further social upliftment and economic empowerment from non-monetary benefits. The following section will conclude on the challenges associated with identifying and remunerating traditional knowledge holders, providing suggested solutions.

10.3 Traditional knowledge is not adequately recognised and compensated

The results from this research have shown that the resurrection bush is used for a variety of different purposes among indigenous local communities and many traditional practices associated with the species are still employed today. NGOs have played a vital role in documenting traditional knowledge and assisting local communities to commercialise the resurrection bush in a fair and equitable manner. NGOs help to represent the interests of communities to ensure that they are compensated and that resource overexploitation, which reduces future benefits, does not occur. The CBD and the Nagoya Protocol came into force to ensure that equity and justice among traditional knowledge holders is realised and that natural resource commercialisation is carried out in a sustainable manner, in this way safeguarding knowledge holders from the exploitation and monopolisation of their resources and associated indigenous knowledge.

When natural resource commercialisation takes place, it is important that parties understand the traditional knowledge associated with the resource in order to recognise and respect the traditional holders of this knowledge. The results from this study show, however, that many commercial entities associated with the resurrection bush do not fully acknowledge traditional knowledge holders for their innovations and creativity, despite such knowledge informing their commercialisation of the resource and guiding the development of their

product. In many cases, commercial actors find alternative means to obtain raw material, in this way bypassing national laws and requirements. Biotrade commercialisation approaches are characteristic of this. This approach commercialises products with traditional origins without remunerating communities for the use of their innovations. NTFP commercialisation is supposed to increase income and employment opportunities for the poorest sectors of society; however, this will not be achieved if traditional knowledge continues to remain uncompensated for and if the price paid for raw material remains exploitative and unfair. A possible solution would be to invest in research in order to document traditional knowledge and develop up-to-date databases which can be used to inform future commercialisation activities. Raising awareness among private companies involved in resource commercialisation is also important to ensure compliance with the Nagoya Protocol and national legislation. If traditional knowledge extends beyond national boundaries, then transboundary cooperation should be developed between countries and associated traditional knowledge holders. The following section concludes on the harvesting methods employed by resurrection bush harvesters and the need for conservation efforts to be employed at the local level.

10.4 Poor links exist between conservation and commercialisation

The intention of the CBD and Nagoya Protocol was to equitably share and distribute benefits derived from bioprospecting commercialisation approaches to provide an incentive for the sustainable use and conservation of natural resources. However, this research has revealed that the conservation of the resurrection bush is not being comprehensively addressed and that few measures are in place to safeguard and protect the species. The informal trade of the resurrection bush is unregulated and therefore the sustainability and conservation of the species is a concern, particularly if volumes are large and if customary laws are not enforced. Although most biotrade commercialisation approaches are supported by NGOs to ensure sustainable harvesting, few long-term conservation efforts to conserve the species and the population as a whole are being adopted. Some cases show that the resurrection bush is harvested directly from the wild directly by commercial entities for biotrade activities, therefore there is little monitoring or control to oversee harvesting methods and practices. This further adds to the concern regarding the conservation of the species as these activities take place without permission or consultation with land owners. Bioprospecting commercialisation approaches are predominantly administered by sustainable harvesting

activities, where NGOs work directly with harvesters to employ the most sustainable methods. However, long-term conservation efforts remain the responsibility of government and are typically not developed or implemented, raising concerns for the continuity of the resource when market demands increase and harvesting activities intensify.

10.5 Recommendations

A number of recommendations intended to help inform current and future commercialisation approaches are provided below:

1. NGO support for communities commercialising natural resources is imperative given that they are fundamental to facilitating the commercialisation and negotiation process and implementing sustainable harvesting measures on the ground.

2. NGOs are largely active in biotrade and bioprospecting commercialisation approaches. By contrast, informal trade activities take place without any external support. It is important for government and local organisations to identify and monitor informal trade activities and implement necessary measures to ensure that resource offtake is sustainable, and that equity is achieved. It is evident that commercial entities are sourcing raw material from informal traders without prior agreements. This poses a future threat of overharvesting and exploitation.

3. NGOs play a key role in assisting harvester groups to develop formal organisations through which commercialisation can take place. This provides harvesters with a platform to negotiate commercial deals in a fair and equitable manner. Harvesters who operate independently do not receive maximum benefits from commercialisation activities and are not in a position to negotiate prices. Developing or strengthening harvester organisations or associations therefore can empower harvester groups and provide a foundation for negotiations between commercial actors to take place, in this way helping to eliminate elite capture and control. In this way, prior informed consent and benefit-sharing agreements can be discussed and signed in an efficient and transparent manner.

4. Documenting traditional knowledge is essential to ensure that benefits are equitably distributed. In some cases, countries have not conducted research with traditional communities to document their historical uses for natural resources. This is a significant challenge for countries who wish to commercialise natural resources and comply with the Nagoya Protocol. Without adequate databases and historical records, benefit sharing becomes challenging, and in many cases, traditional knowledge holders are overlooked due to the absence of adequate documentation.

5. The traditional knowledge of a variety of plant species – including the resurrection bush – extends beyond national borders; therefore, establishing transboundary cooperation is essential in order to equitably distribute benefits to the respective traditional knowledge holders across its distribution. Transboundary cooperation can also assist with managing the use and sustainability of natural resources. An important component will be to harmonise regulatory frameworks to ensure that local communities maximise on resource commercialisation. Article 10 of the Nagoya Protocol refers directly to this by proposing the development of multilateral benefit-sharing mechanisms through which the utilisation of genetic resources and/ associated traditional knowledge can be accounted for in transboundary situations.

6. Donors and support organisations should be encouraged to invest in value-addition mechanisms in the country where the resource is harvested in order to maximise the potential benefits from commercialising the resurrection bush. It was found that the majority of value-addition activities take place outside of provider countries, thereby reducing benefits for local communities and the country at large. Benefit sharing can be maximised by investing in appropriate technologies in the providing country. Non-monetary benefits are just as important as monetary benefits: the skills and capacities of local communities and local researchers can be improved if value addition were to take place within their geographical range. Without such changes, harvesters and local researchers will continue to benefit only from raw material sales, and the opportunity to further advance their skills and knowledge will be disregarded.

7. The knowledge associated with cultivating and propagating the resurrection bush should be made publicly available to enable wider cultivation activities in order to meet increasing demands. Such knowledge should be transferred to rural communities to minimise elite capture and promote the conservation-through-use approach at a local level.

8. Lastly, but most importantly, the conservation efforts of commercial resources need to be developed (or strengthened), implemented, monitored, and maintained. Currently, no commercialisation approaches associated with the resurrection bush have implemented any adequate conservation measures to ensure the sustainability of the resurrection bush in the long-term. Sustainable harvesting practices are being enforced for the majority of commercialisation activities, but sustainable offtake does not guarantee or imply a continuous supply. Measures should be adopted such as allocating conservation areas where the resource occurs, developing a management plan for the species at a national level, and/or establishing private reserves to preserve the species. Cultivating the resurrection bush takes harvesting pressure off wild resources but it does not feed into the conservation of the resource. Therefore, including conservation in national ABS legislation and policies is crucial for natural resource commercialisation to uphold future benefits.

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Annexure

ANNEXURE 1: TABLE SHOWING THE RESEARCH OBJECTIVES THAT THE RESURRECTION BUSH HARVESTER INTERVIEWS ADDRESSED

Who	Objective	Examples of questions to achieve each objective
Harvesters	1	1. The historical/traditional use and traditional knowledge associated with *M. flabellifolius*
	2	1. The different commercialisation approaches associated with *M. flabellifolius*
	3	1. The role of harvesters in the commercialisation process 2. Differences in harvesting methods for the different commercialisation strategies 3. Differences in income received by harvesters from the sale of *M. flabellifolius* from the different commercialisation strategies
	5	1. How the different commercialisation strategies have impacted livelihoods – positive and negative

ANNEXURE 2: TABLE SHOWING THE OBJECTIVES THAT THE KEY INFORMANT INTERVIEWS ADDRESSED, AND EXAMPLES OF THE QUESTIONS ASKED

Who			Objective	Examples of questions to achieve each objective
Namibia	**Zimbabwe**	**South Africa**	2	1. The different commercialisation strategies (low technology – herbalists and across borders and high technology - extract)
NGO – IRDNC	BIZ	DEA		
NGO – IRDNC and KCINP Trust	BIZ	Private companies	3	1. Role in the commercialisation process
IRDNC and KCINP Trust	BIZ and private companies	Private companies		1. The different commercialisation strategies through which *M. flabellifolius* is sold (low and high technology) 2. The different value chains and actors involved in the commercialisation process 3. Their role in the commercialisation process
IRDNC and processing facility	Private companies	Private companies		1. How the processing procedure takes place 2. How much of the raw material is processed 3. Where the processed/raw material is sold to 4. How much is the processed/raw material sold for?
IRDNC and private companies	BIZ and private companies	Private companies		1. How the *M. flabellifolius* extract (high technology)/raw material (low technology) is made 2. Who the processed material is distributed to 3. How much is the extract/raw material sold for?

				4. What is the final product sold to consumers?
IRDNC, regional and national authorities	BIZ	Government departments, private companies	4	1. How do commercial actors gain access to resources? 2. What agreements are in place for access to resources? 3. What benefit-sharing agreements are adopted (who receives what)?
IRDNC, regional and national authorities	BIZ, regional and national authorities	DEA, private companies	5	1. How the nation as a whole and local livelihoods are affected either negatively or positively from *M. flabellifolius* commercialisation 2. Perceptions on whether the resource is harvested sustainably and what measures are in place to conserve the resource

ANNEXURE 3: INTERVIEW QUESTIONS

RESURRECTION BUSH HARVESTERS

1. Tell me about yourself – how did you get involved with the harvesting of the resurrection bush?
2. How did you find out about the resurrection bush?
3. Did/do your parents use the resurrection bush?
4. What did/do they use it for?
5. Do you harvest the resurrection bush for your own use?
6. If yes, how long have you been harvesting for your own use? Years or months
7. What do you use the resurrection bush for?
8. If no, why do you harvest the resurrection bush?
9. What part of the plant do you harvest for your own use? Why?
10. How often do you harvest the resurrection bush for your own use?
11. How much resurrection bush do you harvest for your own use?
12. What else can the resurrection bush be used for?
13. Do you harvest the resurrection bush to sell?
14. If yes, how long have you been harvesting the resurrection bush to sell? Years or months
15. What does your role as a harvester entail?
16. Is it easy to find the resurrection bush in your area? Why?
17. What part of the plant do you harvest to sell?
18. What time of the year do you harvest the resurrection bush? Why then?
19. How much do you get paid per kg of the resurrection bush?
20. Are you happy with this amount? Why?
21. Do you know what the sold raw material is used for?
22. Is income from harvesting plants your only source of income?
23. If no, what other activities are you involved in that provide additional income?
24. Of these activities which are the 5 most important?
25. What part of the plant do you harvest to sell?
26. What time of the year do you harvest the resurrection bush? Why then?
27. How much do you get paid per kg of the resurrection bush?
28. Are you happy with this amount? Why?
29. Do you know what the sold raw material is used for?
30. What are your biggest problems/worries as a resurrection bush harvester?
31. Do you have any rituals or cultural practices associated with the resurrection bush?
32. If yes, please explain
33. Would you like your children to harvest the resurrection bush like you do? Why?
34. How has the harvesting of the resurrection bush impacted your livelihood?

NGO's, COMMUNITY TRUSTS, LAWYERS AND RETAIL COMPANIES

1. Tell me more about yourself and your background
2. Can you tell me about the history of the organisation or company? When was it established? What does the organisation or company do?
3. What natural plant products does the organisation or company specialise in?
4. What is your role at the organisation or company?
5. What sparked your interest in natural plant products and the resurrection bush? How did this come about?
6. Does any research and development take place at the organisation or company? Explain, and specifically the resurrection bush?

7. What is your knowledge on the use of the species? Traditional or other? How did you find out about this?
8. Do you know if the resurrection bush is used by different industries or sectors? Health (biopharmaceutical), cosmetics, agriculture, food and beverages, biotechnology, botanical etc. And what is it used for?
9. How did the organisation or company get involved with the commercialisation of the species?
10. Are there multiple ways of commercialising the plant? If so, what are they?
11. What is the organisation or company's' role within the resurrection bush commercialisation process?
12. What does this role entail?
13. Please explain the harvesting process of the resurrection bush.
14. What is your relationship with commercial entities or NGOs? How did that develop?
15. How does your partnership with commercial entities or NGOs work?
16. How much does the organisation or company sell the raw material per kg for?
17. Are there any quality requirements for the raw material that you sell?
18. If yes, what do these quality requirements entail?
19. Do you sell the raw material?
20. If yes, to whom? And for how much?
21. If yes, what part of the resurrection bush plant do you sell?
22. Do you sell any raw material to 3rd parties with conditions around their use of the species?
23. Do you sell any raw material for further research and development? Explain
24. Do you process the raw material?
25. If yes, what part of the plant do you use? Why?
26. How much raw material is processed (kg) to get 1L of extract? (for example)
27. Do you sell this extract on its own in its liquid form?
28. Do you sell the extract to any 3rd parties with conditions around their use of the extract?
29. Do you sell any extract for further research and development? Explain
30. How much is the extract sold for?
31. Where is it sold to?
32. If it is not sold, what is it used for?
33. Do you sell any products that contain the resurrection bush extract? Please explain
34. Where are these products sold?
35. How much are they sold for?
36. What percentage of the resurrection bush is used in these products?
37. What are your resurrection bush products called?
38. What does this name mean or how did you come up with this name?
39. How did you find out about the properties of the plant and the potential to extract from the species?
40. Would you consider cultivating the resurrection bush? Why?
41. How many employees work for the organisation or company?
42. Do you have benefit sharing agreements/requirements in place relating to resurrection bush and/or the TK associated with it?
43. If yes, what does the agreement entail? With who?
44. If no, why not?
45. Are there different ABS requirements or agreements between the countries? Explain
46. Do you think there should be some kind of regional ABS strategy around the resurrection bush? Explain

47. Do you consider the use of the resurrection bush as biotrade or bioprospecting? Why? Is there intensive R&D?
48. Do you need a bioprospecting permit?
49. If yes, do you have one? If no, why not?
50. Which country/ countries require this permit?
51. What is your experience with obtaining the permit?
52. What does the permit process entail?
53. What does the permit allow or restrict?
54. Do you know if there are any permit requirements to harvest the plant? For conservation purposes? Explain
55. How are your products marketed? What is the selling point of the species
56. Where do you see the future of the plants commercialisation? Explain
57. Is the market very competitive?
58. Do you know of any local or international competitors? If yes, who are they? What do they sell?
59. What are the biggest challenges faced by the resurrection bush industry as a whole?
60. What are your future predictions for the resurrection bush?

GOVERNMENT OFFICIALS

1. What does your role entail?
2. What does this role entail?
3. What is your knowledge of the resurrection bush?
4. Do you know what it is used for?
5. Who are the owners of natural resources on communal land?
6. How does the harvesting of the resurrection bush take place?
7. Are there any customary laws around harvesting the resurrection bush?
8. Are you responsible for the regulation of the resurrection bush in any way?
9. Is the resurrection bush being sold?
10. How is the use of the resurrection bush regulated?
11. How do commercial actors gain access to the resurrection bush?
12. What agreements are in place to facilitate access to the plant? Local vs regional vs international?
13. What are the main aspects of the benefit sharing agreement?
14. Have any permits been issued for the resurrection bush? If so to who? What do they use the species for?
15. Is there any traditional knowledge associated with the resurrection bush?
16. If yes, how is that accounted for?
17. What progress has been made with the issuing of permits and the implementation of benefit-sharing agreements for the resurrection bush?
18. What are your thoughts around multilateral benefit-sharing mechanisms?
19. How does the nation as a whole benefit (or not) from the commercialisation of the resurrection bush?
20. Does a portion of the sale of the resurrection bush go to the government?
21. If so, how much and what are these funds allocated for?
22. How are the livelihoods of local communities affected by the commercialisation of the resurrection bush? Positively and negatively?
23. Do you know if the resurrection bush is harvested sustainably? Explain
24. Are there efforts in place to conserve the resource? Explain
25. What is your level of concern for the sustainability of the plant in the wild presently?
26. What are your thoughts on cultivating the resurrection bush?
27. Do you know of anyone that cultivates the resurrection bush? If yes, please explain

28. What are you perceptions on wild harvested versus cultivated resurrection bush?
29. Can you tell me more about the permit system for harvesting the resurrection bush:
    a) Who all must apply for a permit?
    b) Are harvesters required to have a permit?
    c) How do you go about getting a permit?
    d) How long is the permit valid?
    e) What are the conditions of the permit?
    f) How are cases where people are operating without a permit being addressed?
30. What have been the major obstacles faced with implementing regulations for the resurrection bush?
31. What are the main concerns relating to the resurrection bush industry?
32. How do you view the future of trade in the resurrection bush?
33. What possible opportunities do you foresee?
34. Do you have any recommendations for the future of the resurrection bush?

CULTIVATION FARMERS

1. Can you tell me more about yourself, your background?
2. Where/how did you find out about the resurrection bush?
3. What sparked your interest in cosmetics and the resurrection bush? How did this come about?
4. Can you tell me about the history of Myro AG? When was it established? What does the company do? Where is the company based?
5. What products does Myro AG specialise in?
6. Does any research and development take place at Myro AG? Explain, and specifically the resurrection bush?
7. How did you get involved with the commercialisation of the species?
8. Are there multiple ways of commercialising the plant? If so, what are they?
9. Do you use the resurrection bush in your home? For what?
10. What is your knowledge on the use of the species? Traditional or other? How did you find out about this?
11. Do you know if the resurrection bush is used by different industries or sectors? Health (biopharmaceutical), cosmetics, agriculture, food and beverages, biotechnology, botanical etc. And what is it used for?
12. When was the resurrection bush nursery established?
13. How or why did you get involved with cultivating the resurrection bush?
14. How long have you been cultivating the resurrection bush?
15. What was the purpose of the establishment of the nursery?
16. How big is the cultivated area?
17. Where do you get your seeds or seedlings from? Why?
18. I know this is a sensitive questions but can you tell me more about the costs of inputs; seeds, technical equipment, labour, water, lease of land?
19. Do you make use of any fertilizer/herbicide/pesticide?
20. What are the challenges associated with cultivating the resurrection bush?
21. At what time of the year do you plant the resurrection bush?
22. When do you harvest? Please explain the harvesting process including harvesting methods
23. How much resurrection bush do you plant and harvest a year? Do you harvest it all at once?
24. What are the social benefits of the establishment of the nursery?

25. How many employees work for your nursery and company? SA and Switzerland and or other
26. Are they permanent employees?
27. Do you think cultivating is better than wild harvesting? Explain
28. Do you think the resurrection bush is under threat in the wild? Explain
29. What is your role within the resurrection bush commercialisation process? (nursery and company)
30. Do you sell the raw material? If yes, to whom? Local and international?
31. What part of the plant do you sell?
32. Are there any quality requirements for the plant part sold?
33. How much is the raw material sold for? How is this determined?
34. Has the price changed since the nursery opened? If so, how or why?
35. Do you sell any raw material to 3rd parties with conditions around their use of the species?
36. Do you sell any raw material for further research and development? Explain
37. Do you process your own resurrection bush?
38. What does this process entail? Explain extraction process
39. What part of the plant do you use?
40. Do you sell the extract in its liquid form?
41. Where is it sold to? Locally and internationally?
42. How much is it sold for? How is this determined?
43. Do you sell the extract to any 3rd parties with conditions around their use of the extract?
44. Do you sell any extract for further research and development? Explain
45. How much raw material is processed (kg) to get 1L of extract? (for example)
46. What is the processed extract used for? By yourself or other companies?
47. What products are then sold to consumers?
48. Where are these products sold? Locally and internationally
49. How much are they sold for? How is this determined?
50. What percentage of the resurrection bush is found in these products?
51. How did you find out about the properties of the plant and the extraction process?
52. Do you import the resurrection bush from other locations?
53. How much do you pay per kg of raw material? How is this price determined?
54. Is this different to the resurrection bush at the nursery?
55. If so, what makes it different?
56. What is it used for?
57. How much is it sold for? How is this determined?
58. Is there a difference in the demand for extract from cultivated resurrection bush versus wild resurrection bush? If yes, why? What are the differences between the two?
59. Do you have benefit sharing agreements/requirements in place relating to resurrection bush and/or the TK associated with it? Where?
60. If yes, what does the agreement entail? With who?
61. If not, why not?
62. Are there different ABS requirements or agreements between the countries? SA vs Switzerland and other countries? Explain
63. Do you think there should be some kind of regional ABS strategy around the resurrection bush? Explain
64. Do you consider your use of the resurrection bush as biotrade or bioprospecting? Why? Is there intensive R&D?

65. Do you need a permit to cultivate? If yes, what does this entail?
66. How is the growing, buying and selling of the resurrection bush regulated?
67. Do you need a bioprospecting and export permit?
68. If yes, do you have one? If no, why not?
69. Which country/ countries require this permit?
70. What is your experience with obtaining the permit?
71. What does the permit process entail?
72. What does the permit allow or restrict?
73. How are your products marketed? What is the selling point of the species? (species, TK, imagery of local people)
74. Would you consider the commercialisation of the resurrection bush successful? Explain
75. Is the market for the resurrection bush very competitive?
76. Do you have any local or international competitors? If yes, who are they? (in SA, Switzerland or elsewhere) what do they sell?
77. What are the biggest challenges faced by the resurrection bush industry as a whole? In SA compared to Switzerland and/or elsewhere?
78. Where do you see the future of the plants commercialisation? Explain
79. What are your future predictions for the resurrection bush? New products, expanding the nursey etc.?

PROCESSING FACILITY

1. Tell me more about yourself, what is your role?
2. What is your knowledge on the resurrection bush? How did you find out about the species? Do you know what it is used for? Do you use it yourself?
3. What is your role within the resurrection bush commercialisation process?
4. What does this role entail? From start to finish (the processing procedure)
5. Where do you get the resurrection bush from? (raw material)
6. What part of the plant is harvested?
7. Is any of this raw material sold locally or internationally? Explain
8. Do you process any raw material?
9. If yes, how did you find out about the potential to extract from the species?
10. What part of the plant is used in the extraction process?
11. Are there any specific quality requirements?
12. How much raw material is processed (kg) to get 1L of extract? (for example)
13. What percentage of the resurrection bush is in the extract?
14. How much resurrection bush is processed each year?
15. Where is it sold to?
16. How much is the extract sold for?
17. Do you know what the processed material is it used for?
18. How much do harvesters get paid and how much goes to the processing facility? How are the funds allocated from the sale of raw and processed material?
19. Is the facility interested in cultivating the resurrection bush? Why?
20. Would the facility consider making a resurrection bush tea in the future?
21. Do you think the species is under threat?
22. What regulations are currently in place regarding the trade of the resurrection bush?
23. Are there efforts in place to conserve the species?
24. What are the biggest challenges of being a processor?
25. What are the biggest challenges facing the resurrection bush industry as a whole?
26. What are your future predictions for the resurrection bush?
27. How are your products marketed? What is the selling point of the species? (species,

TK, imagery of local people)

28. Would you consider the commercialisation of the resurrection bush successful? Profits vs expenses
29. Is the market for the resurrection bush very competitive? Who are your competitors?
30. Are there any plans for new products that contain the resurrection bush?