Medicinal plant trade and opportunities for sustainable management in the Cape Peninsula, South Africa

by

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Declaration

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Date: 15 December

Abstract

Medicinal plants represent an important asset to the livelihoods of many people in developing countries. This is the case for South Africa where most of the rural and also urban communities rely on medicinal plants for their primary healthcare needs and income generation. Harvesting for domestic usage is not generally detrimental to the wild populations of medicinal plants. However, the shift from subsistence to commercial harvesting is posing unprecedented extinction threat to the wild populations of medicinal plants. The purpose of this investigation was to: (1) document the most traded/used species of medicinal plants in the Cape Peninsula, including parts used, sourcing regions, harvesting frequencies and seasons as well as the conservation status of these species; (2) to profile and investigate the rationales for the involvement of stakeholders in medicinal plants related-activities; and to (3) assess constraints and opportunities for sustainable management of medicinal plants in the Cape Peninsula. Triangulation techniques such as semi-structured questionnaires, formal and informal interactions with key informants from the Cape Peninsula and surroundings, personal observations and field visits were used to gather relevant data for this investigation.

Accordingly, about 170 medicinal plant species were found to be actively traded or used in the study area. These species were mostly traded/used for their underground parts; shoot, barks and in many cases the whole plant is uprooted. The bulk of traded/used species were from the wild populations, harvested on monthly basis and the Western and Eastern Cape provinces acted as the main source regions. Some of the traded/used species are rare, vulnerable, endangered, critically endangered and are declining from the wild. Nonetheless, there are subtitutes for some of these medicinal plant species. Traders and collectors were mainly men in the Cape Peninsula. Cultural considerations, economic conditions and the burden imposed by the number of dependents were the factors influencing local communities to engage in medicinal plants related-activities.

Despite the fact that the majority of the informants acknowledged the decline of medicinal plants from wild stocks, an overwhelming number of them expected an upsurge in the future demand for natural remedy due to its popularity among South Africans. Similarly, the majority of the respondents were aware of the conservation status of the plants that they were using, but this did not prevent them from trading/using some protected species. Encouragingly, an overwhelming number of the informants were willing to use cultivated species and cultivate some of the most used medicinal plant species if seeds and land were freely provided. It is noteworthy that these results were influenced by the gender, age, category and time of involvement in medicinal plants, ethnicity and residence status of the respondents as well as the source of supply of medicinal plants. It is recommended that species that have been identified of concern should be prevented from further commercial harvesting. Competent conservation organizations like CapeNature should focus on practical skills development of people who have expressed willingness to cultivate medicinal plants or are already doing so, especially in plant propagation and basic gardening techniques.

Opsomming

Medisinale plante verteenwoordig 'n belangrike bate tot onder verdeling van die bestaan van baie mense in ontwikkelende gemeenskappe. Dit is ook die geval vir Suid-Afrika, waar meeste landelike en ook stedelike gemeenskappe afhanklik is van medisinale plante vir primêre gesondheids doeleindes asook inkomste voortbrenging. Oes van medisinale plante vir huishoudelike gebruik is gewoonlik nie skadelik vir wilde populasies nie, maar die sigbare skuif van bestaansboerdery na kommersiële oeste skep 'n bedreiging vir die voortvarendheid van hierdie wilde populasies. Die doel van hierdie studie was: (1) om vas te stel watter medisinale plant spesies word die meeste gebruik/verhandel in die Kaapse Skiereiland, insluitend die plantdele gebruik, areas waar geoes word, oes frekwensies en seisoen van oes, asook die bewaringstatus van die spesies; (2) om ondersoek in te stel na die hoof redes waarom aandeelhouers by medisinale plant verwante aktiwiteite betrokke is; (3) om die beperkinge en geleenthede van volhoubare bestuur van medisinale plante in die Kaapse Skiereiland te assesseer. Triangulasie tegnieke soos semi-gestruktureerde vraelyste, formele en informele interaksie met sleutel segsmanne van die Kaapse Skiereiland en omliggende areas, persoonlike waarnemings, en veld besoeke was alles gebruik om relevante data vir hierdie ondersoek te verkry.

Gevolglik was gevind dat sowat 170 medisinale plant spesies aktief in die studie area verhandel of gebruik word. Hierdie spesies was meestal verhandel vir hul ondergrondse plant dele. Daarmee saam ook lote, insluitend die bas, en ook in baie gevalle heel plante waar die hele plant opgegrawe en verkoop word. Die meerderheid van die verhandelde/gebruikte spesies was van wilde populasies, geoes op 'n maandelikse basis met die Wes-en Oos-Kaap provinsies as die hoof bron areas. Sommige van die verhandelde/gebruikte spesies is raar, kwesbaar, bedreig, krities bedreig en toon afnames uit die natuur. Nietemin, daar bestaan wel plaasvervangers vir sommige van hierdie medisinale plant spesies. Handelaars en versamelaars was hoofsaaklik mans van die Kaapse Skiereiland. Kulturele inagnemings, ekonomiese kondisies en die las van aantal afhanklikes was die faktore wat plaaslike gemeenskappe beïnvloed het om verbind te word aan medisinale plant verwante aktiwiteite.

Ten spyte daarvan dat die oorgrootte meerderheid van segsmanne bewus is van die afname van medisinale plante in wilde populasies, verwag 'n groot hoeveelheid van hulle ook dat daar 'n opgang in die toekomstige aanvraag na hierdie natuurlike geneesmiddels sal wees omdat dit so gewild is onder Suid-Afrikaners. Soortgelyk was die oorgrootte meerderheid van die respondente wel bewus van die bewaringstatus van die plante wat hul gebruik, tog het dit hulle nie verhoed om hierdie beskermde spesies te gebruik of te verhandel nie. Aan die positiewe kant, 'n groot aantal van die respondente het ook aangedui dat hulle bereid is om gekweekte spesies te gebruik en om selfs van die mees gebruikte spesies self te kweek, mits saad en land verniet verskaf word. Dis opmerkingswaardig dat hierdie resultate beïnvloed was deur geslag, ouderdom, kategorie en tyd van betrokkenheid by medisinale plante, etniese verwantskap, woning status asook die voorsieningsbron van die medisinale plante. Dit is voorgestel dat spesies wat as in gevaar geïdentifiseer is, verbied moet word om verder kommersieel geoes te word.

Bekwame bewarings organisasies soos *CapeNature* moet fokus op praktiese handigheids ontwikkeling van daardie mense wat aangedui het dat hulle wel bereidwillig is om medisinale plante aan te kweek asook die wat al klaar besig is met kweek, veral rondom plant voortplanting en basiese tuinmaak tegnieke.

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Chapter 1: Introduction

Throughout the world, millions of people depend partly or fully on both wild and managed biological diversity to fulfil their basic subsistence requirements (Cotton, 1996; Cunningham, 2001; Millennium Ecosystem Assessment, 2005). Among these crucial resources are plants, which in developing countries are important in providing rural people with building materials, fuel, fibre, medicine and also income (Cunningham, 2001; Shanley and Luz, 2003; Rai and Uhl, 2004; Bitariho *et al*., 2006; Shackleton *et al*., 2007; Shackleton and Shacleton, 2004; Suntherland *et al*., 2004; Belem *et al*., 2007; Quang and Anh, 2006). For example, in South Africa's rural areas, as much as 85% of the households depend on non-timber forest products (NTFPS), which include wild spinaches, fuel wood, wooden utensils, grass hand-brushes and edible fruits to meet their every day needs (Shackleton and Shackleton, 2004). This is also true in other developing countries from Africa, Asia and South America, as indicated by the preceding literature.

Besides the consumptive benefits, plants as integral components of ecosystems, contribute to the provision of non-consumptive benefits that add to making human life both possible and worth living. Some of the ecosystems non-consumptive services include the regulation of extreme temperatures, floods, droughts, the forces of wind and the provision of recreational, inspirational and educational sites (Millennium Ecosystem Assessment, 2005; Diaz *et al*., 2006). Some of these non-consumptive benefits enhance not only human well-being, but also contribute to improving their mental health.

1. 1. Importance of plants in traditional healthcare systems

In almost all cultures, there exists traditional knowledge related to the health of people and animals (Hoareau and DaSilva, 1999). For example, the earliest writings from Babylonia, Egypt, China and India, with reference to healing herbs, indicate a prehistoric origin for the use of plants as medicines. The ancient Egyptians listed more than 850 medicinal plants and remedies in the *Ebers papirus*, which is a medical scroll from about 1500 B.C (Sumner, 2000). The Hindu medicinal information, compiled in the Rig Veda (poem), was written about 1500 B.C. (Sumner, 2000). Today, as much as 80% of the population in developing countries depends

on traditional health systems for their basic healthcare needs (WHO/IUCN/WWWF, 1993). Besides the heavy dependence in developing countries, complementary or alternative medicine (CAM), which is the adaptation of traditional medicine (TM), is spreading in developed countries.

Although, animal and mineral materials are used, medicinal plants play a central role in traditional healing practices (WHO/IUCN/WWF, 1993). For example, in southern Africa, where the majority of people consult traditional healers for their primary healthcare needs, approximately 85% of material used by traditional health practitioners originates from plants (McGaw *et al.*, 2005). The remaining 15% consist of animal and mineral material. In china, approximately 1000 species of plants are commonly used in Chinese Traditional Medicine (CTM) and only 40 items are animal and mineral products (He and Sheng, 1997).

Relegated for a long time to a marginal place in the healthcare system, especially in developing countries, traditional systems of healthcare have undergone a major revival in the last 20 years. The importance of traditional medicine as source of primary healthcare was first officially recognized by the World Health Organization (WHO) in the primary Health Care Declaration of Alma Ata in 1978. WHO has described traditional medicine as one of the surest means for achieving total healthcare coverage of the world's population. As a result, WHO called African governments in 2003 to formally recognize traditional medicine. Today, an increasing number of countries, including China, Mexico, Nigeria and Thailand have incorporated traditional medicine into their primary healthcare systems (Balick and Cox, 1997).

In Africa where the rates of urbanization are the highest, there has been an increase in the demand for medicinal plants. This increase in demand, especially in urban centres, has motivated not only the migration of traditional health practitioners from rural to urban areas, but also the involvement of commercial harvesters in search of income. Unfortunately, as the bulk of traded medicinal plant species are wild-harvested, many of these medicinal plant species, due to over-harvesting, are under extinction threat (Cunningham, 1993).

1. 2. South African informal market for medicinal plants

Like other developing countries, the majority of South African population relies on traditional medicine for their primary healthcare needs. Mander (1998) found that between 35,000 and 70,000 tons of plant material is consumed by about 27 million of herbal remedy

consumers each year. There are as much as 200,000 traditional healers practicing in the country (Mander *et al*., 2006). With urbanization, poverty and unemployment, the demand for medicinal plants has considerably increased in urban centres (Cunningham, 1993; Mander, 1998). The resulting consequence of this increase in demand has motivated massive involvement of other role players such as commercial gatherers and traders. For example, In KwaZulu-Natal, Mander (1998) reported between 20,000 and 30,000 people, mainly women, making a living from the trade of non-timber forest products, particularly medicinal plants.

In the past, harvesting of medicinal plants was the domain of trained traditional healers, well-known for their skills as herbalists or diviners who respected customary conservation practices. Taboos, seasonal and social restrictions, limitation of harvested quantities and the nature of plant gathering equipment used served to limit medicinal plant harvesting (Cunningham, 1993). Today, however, with the involvement of commercial gatherers, whose main objective is to make profit, cases of over-harvesting have been reported and some species have become rare, vulnerable, threatened or purely extinct from the wild (Cunningham, 1993; Coetzee *et al*., 1999; Williams *et al*., 2000; Dold and Cocks, 2002; Afolayan *et al*., 2004). For example, species such as *Ocotea bullata*, *Warburgia salutaris* or *Boweiea volubilis* are reported to have become rare. Moreover, *Siphonochilus natalensis* is extinct from the wild due to active trading (Cunningham, 1993). Therefore, documenting the trade of biodiversity in general and medicinal plants in particular is the first step in identifying species in need of conservation and sustainable management.

1. 3. Problem statement

Medicinal plant resources are dwindling worldwide. It is believed that habitat destruction and unsustainable harvesting practices are the main causes for the loss of medicinal plants (WHO/IUCN/WWF, 1993). This is true in most developing countries where the shift from subsistence to income generation harvesting has escalated the threats (Mander, 1998; Hoareau *et al.,* 1999; Le Breton, 2001; Botha *et al*., 2004). It is noteworthy that the depletion of medicinal plants was first brought into the attention of governments during the 1988 WHO/IUCN/WWF International Consultation on Conservation of Medicinal Plants held in Chiang Mai, Thailand. One of the recommendations from this consultation was the international cooperation and coordination for the establishment of programmes for conservation of medicinal plants to ensure

that these resources are available for future generations. For example, an understanding of market profiles, species in trade and impact of harvesting on plant species (as well populations), social, economic and cultural attributes of role players may contribute to effective resource management and conservation.

To date, most documentation on the trade in medicinal plants in South Africa has been undertaken in KwaZulu-Natal (Dauskardt, 1990; Mander, 1998), Gauteng (Williams,1996; Williams *et al.*, 1997), Mpumalanga (Dauskardt, 1990; Botha *et al.*, 2004), Limpopo (Botha *et al.,* 2004) and the Eastern Cape (Dold and Cocks, 2002) provinces. These studies have revealed and documented species in trade, sources of supply, profiled role players and in some cases had established the economic value of the trade. The number of species and the quantity of plant materials traded are tremendous. For example, in KwaZulu-Natal, about 4,300 tons of medicinal plant materials from 400 species were annually consumed by about 6 million indigenous medicine consumers (Mander 1998). This trade would have generated an expenditure of some R60 million per annum. In the Eastern Cape Province, about 525 tons of plants material from 166 species of medicinal plants were consumed annually (Dold and Cocks, 2002). This active trade was approximately valued at R27 million per year. In Witwatersrand (Gauteng), Williams *et al.* (2000) inventoried 511 species of medicinal plants frequently traded and Botha *et al.* (2004) recorded 176 species in Mpumalanga markets and 70 species in Limpopo medicinal plant markets. All these studies have revealed cases of over-exploitation of medicinal plant resources.

However, the use or the trade of medicinal plants is not only confined to the above mentioned provinces. CapeNature Conservation board, one of the organizations in charge of the management of biodiversity in the Western Cape Province, has reported illegal commercial collections of medicinal plant resources within its protected areas. This research project, therefore, intends to investigate and document this trade.

1. 4. Research aim and objectives

The aim of this study is to document the trade of medicinal plants in The Cape Peninsula. Under this aim, the main objectives are to: (i) inventory the most traded/used species of medicinal plants; (ii) profile socio-economic attributes of stakeholders and to understand the rationales for their involvement in medicinal plants-related activities; and (iii) to assess

constraints and opportunities for the conservation of medicinal plant resources in the study area. In order to adress these objectives; the following subsidiary research questions are answered:

Objective (i): the traded/used species of medicinal plants.

- What are the most traded/used meidinal plant species and parts in the Cape Peninsula?
- Where do species of medicinal plants traded/used in the Cape Peninsula come from?
- What are the most harvesting seasons and at which frequencies?
- What is the financial value of medicinal species traded in the Cape Peninsula?
- What is the conservation status of the traded/used species of medicinal plants in the study area?

Objective (ii): characteristics of the respondents and rationales for their involvement.

- Which are the predominant gender, age groups and ethnicity categories of the people who are involved in medicinal plants-related activities in the Cape Peninsula?
- What are their educational levels?
- Where are they from (residence status)?
- How many dependents do they support?
- Why are they involved in medicinal plants-related activities?

Objective (iii): opportunities and constraints for the conservation of medicinal plants in the Cape Peninsula.

- Are medicinal plant traders/users in the Cape Peninsula aware of the dwindling of some species of medicinal plants in the wild?
- What are their perceptions on the dynamics of future demands for medicinal plants?
- Are stakeholders aware of the conservation status of traded/used medicinal plant species?
- Are there any substitutes for the most traded/used species of medicinal plants?
- What are medicinal plant traders/users perceptions on cultivated species of medicinal plants and cultivation of medicinal plants?
- What are the constraints, needs and the problems faced by stakeholders in practising medicinal plants-related activities in the Cape Peninsula?

1. 5. Description of the study site

      This study concentrates on the Cape Peninsula and its surrounding (Figure 1), which all fall within the Cape Floral Kingdom.

1. 5. 1. Vegetation

      The Cape Floral Kingdom, the smallest of the world's six floral kingdoms, is the most botanically diverse region on earth (highest concentration of plant species in the world). It hosts more than 8,500 species of plant, of which about 5,800 (more than 60%) are endemic, within an area of less than 90,000 square kilometres (Cowling and Richardson, 1995; Goldblatt and Manning, 2000; Wolfart, 2001). More remarkable is that the Cape Peninsula supports about 2,500 plant species, of which 1,500 are found in Table Mountain within an area of 57 square kilometres. Of these plant species, 150 are endemic to the Cape Peninsula area (Cowling and Richardson, 1995; Wolfart, 2001).

      The main types of vegetation occurring within the Cape Peninsula include the western strandveld, lowland fynbos, renosterveld, mountain fynbos and the afromontane forest (Wolfart, 2001). Most of the diversity is found in the fynbos (fine-leaved bush), which is the dominant vegetation type in the Cape Floral Kingdom. Proteas, ericas, restios and geophytes are the four plant types that characterize fynbos. These species grow preferably on the leached and acid sandy soils. Mountain fynbos, which covers the largest area, contains the highest number of plant species within the Cape Peninsula. Renosterveld, which is related to fynbos, grows on more fertile soil and was named after renosterbos (*Elitropappus rhinocerotis*), which is the most prevalent species within this vegetation. Due to its relative fertility, renosterveld soils are more suitable to agriculture and today only 5% of its original size remains. The western strandveld, which is perceivable along the coast of the peninsula, grows on the alkaline sands of ancient marine beds. The dominant bushes and shrubs comprising this vegetation are Cape sumach and sand olive trees. The evergreen indigenous afromontane forest grows in ravines and gorges of the western, southern and eastern slopes of Table Mountain on poor soils, but enriched in humus. Older pioneer species such as yellowwood (*Podocarpus latifolius*), Cape beech, stinkwood (*Ocotea bullata*), wild peach and saffronwood, have survived extensive timber exploitation by the earlier settlers (Wolfart, 2001).

1. 5. 2. Natural resources management

Celebrated not only in South Africa, but also internationally for its richness and uniqueness, the Cape Floral Kingdom is, however, under threat. At least 1,400 plant species are now endangered or close to extinction due to a number of factors (CAPE, 2000). Indiscriminate siting of agriculture and urban development, invasive alien plants, unsustainable and over-use of resources and climate change are the direct factors threatening the biological diversity of the Cape Floral Kingdom, and hence the Cape Peninsula (CAPE, 2000). In response to a request from the Government of South Africa for support for conservation on the Cape Peninsula, the Global Environmental Facility (GEF) of the United Nations for Environmental Programme (UNEP) made a grant of US$12.3 million in 1997. Apart from supporting the establishment of the new Table Mountain National Park (formerly known as Cape Peninsula National Park), US$1 million of this grant was used to launch the ambitious project called CAPE (Cape Action Plan for the Environment, precursor to the Cape Action for People an the Environment). The main objective of that project was to prepare a strategic plan for the long term conservation of the whole Cape Floral Kingdom. The CAPE commenced in late 1998 and in September 2000 the CAPE Strategy was presented to potential funders and passed to various conservation agencies such as the CapeNature for implementation (CAPE, 2000).

In addition to the preceding initiative, several other large conservation planning initiatives are currently ongoing in the Western Cape Province of South Africa. These include Cape Action for People and Environment (CAPE), Succulent Thicket Ecosystem Programme (STEP), Succulent Karoo Environmental Programme (SKEP), Stewardship Programme and so on (see WCNCB, 2007). These programmes mainly aim at raising awareness and interest in the importance of biodiversity and encourage its integration into land use and decision-making. They also intend to expand the existing protected areas through stewardship mechanisms. For example, as much of the biodiversity in the Western Cape Province occurs in the threatened and highly transformed lowlands (mostly privately-owned), the Stewardship Programme, a joint venture between private land-owners and the CapeNature Conservation Board (CapeNature) launched in 2003, aims to promote the conservation of remaining vegetation. In this venture, land-owners undertake to protect and manage their lands or part of lands according to sound conservation management principles. In fact, the CapeNature provides support to the implementation of these management plans. These initiatives have resulted in an increase of

voluntary protected areas from 11.6% to 12.3% for the last five years. Currently, the overall Western Cape Province has 8% of its land area legally secured for the conservation of natural resources (WCNBC, 2007).

Most importantly, the CapeNature, in conjunction with resource users, has elaborated a monthly rotational harvesting plan to allow local communities to harvest within its protected areas. However, despite this initiative, illegal harvesting of natural resources for subsistence and commercial purposes is still occurring within protected areas in the Cape Peninsula.

1. 5. 3. Socio-economic profile of the Western Cape

In 2001, the population of the Western Cape Province was 4,524,335 million, of which 53.9% were coloured, 26.7% black African, 18.4% white and 0.9% were of Indian/Asian origin. About 64% of the population of the Western Cape Province live in the city of Cape Town (Statistics South Africa, 2006). In March 2007, the Western Cape Province had the lowest (17.2%) unemployment rate (25.5% nationally), while the Eastern and Northern Cape, the two neighbouring provinces, had 25.5% and 26.5%, respectively. Nationally, among ethnic groups, black Africans had the highest rate (30.2%) of unemployment, against 19.8% among the coloured people, 13.8% among Indians/Asians and only 4.3% among white people. Black African women (36.4%) and persons aged 15-24 years (about 50%) were substantially the most affected by the unemployment (Statistics South Africa, 2007). This latter trend is also true within the Western Cape Province.

In 2004, 10.5% of workers were employed in the informal sector in the Western Cape, which was below the national figure of 22.2%. Both nationally and in the Western Cape, black Africans had the highest percentage of workers in the informal sector. Conversely to the national figure, where females were dominant in the informal sector, the percentage of males was double in the Western Cape Province. Wholesale and retail trade; community, social and personal services; and manufacturing employed 60% of workers both nationally and in the Western Cape. Nationally and in the Western Cape, persons employed in the informal sector were mainly in the wholesale and retail trade, while the percentage of persons employed in the formal sector was higher in community, social and personal services. In terms of income, more than 80% of workers earned R8,000 or less per month nationally in 2004. More than 80% of domestic

workers and 70% of those employed in the informal sector earned less than R1,000 per month (Statistics South Africa, 2006).

It is well established that the Western Cape Province has better access to services than the other provinces, including housing, health and educational facilities (Cummins, 2002). In 2001, there were only 5.7% of people aged 20 and above who did not attain any formal schooling (17.9% for the whole South Africa), while the majority (36.5%) had some secondary schooling (Statistics South Africa, 2006). In 2003, there were about 23,891 schools, including pre-primary, primary, secondary, intermediate and combined and 55 public hospitals in the province. Eighty-eight percent of the 1.2 million households in the Western Cape Province were housed in formal dwellings in 2004 and 92% of the households used electricity as a source of energy for lighting, which is above the national figure of 80.2% (Statistics South Africa, 2006). These above-mentioned opportunities may have contributed to attract an annual influx of about 48,000 migrants, mainly from the two neighbouring provinces of the Eastern and Northern Cape provinces to the Western Cape Province (Provincial Government of the Western Cape, 2002). Indeed, it was found that 60% of the respondents in the current study originated from the neighbouring Eastern Cape Province alone.
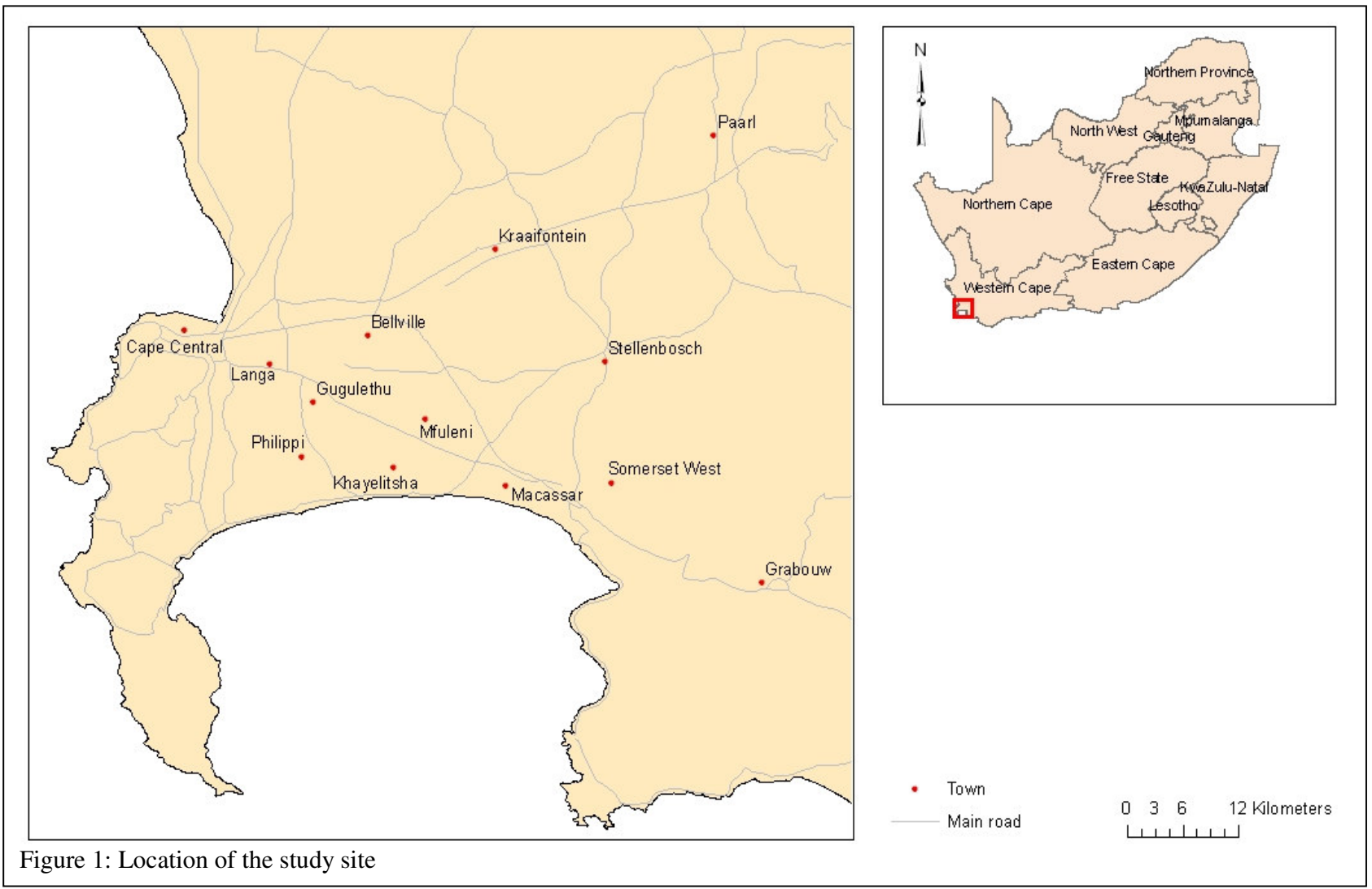
Figure 1: Location of the study site

1. 6. Methodology

The following section describes the methodology used in gathering data that resulted in the findings contained in Capters 3, 4 and 5.

1. 6. 1. First entry and pilot study

It is noteworthy that the surveying of trading places within the Cape Peninsula and the surrounding areas was undertaken in June 2006, after the identification of the key role players in the trade of medicinal plants who were mainly found to be street traders, shop traders, collectors and traditional healers. During this process, no contact was made with traditional healers and collectors. Only few street and shop traders were identified during this process. Thereafter, the preliminary questionnaire was constructed. As the structured questionnaire was highly criticised for being limited (De Vaus, 1986), the questionnaire used to conduct the present study consisted largely of open-end questions.

With the assistance of the CapeNature Community Outreach Unit, many contacts were made, especially with traditional healers and collectors who were mainly Rastafarians ("bush doctors"). Many workshops took place within the Cape Peninsula area. In each location, the purpose of the study was explained to the informants.

In July 2006, a pilot study took place in Mbekweni (Paarl). This pilot study involved 10 Rastafarians who were mainly street trades and collectors and one traditional healer. The administration of the questionnaire or the interview with a key informant took approximately 40 minutes. After testing the questionnaire, the interviewees and researcher worked together to improve the questionnaire. Problematic or ambiguous questions were weeded out or rephrased. Relevant issues that came out from this pilot study were included in the final open-ended questionnaire. These included the access to nature reserves and the obtaining of licence to trade on streets. These interactions with stakeholders were very useful in garnering their support for this investigation.

1. 6. 2. Data collection

Data gathering for this investigation was conducted from August 2006 to July 2007. A combination of data gathering techniques or triangulation techniques was used. The need to achieve objectivity, reliability and validity was the rationale for using triangulation techniques

(Babbie *et al*., 2001; Frankfort-Nachmias and Nachmias, 1996). In fact, in qualitative research, data generated from a single method are often denounced as biased (Frankfort-Nachmias and Nachmias, 1996). Therefore, the triangulation technique used in this study provided the unique opportunity to examine the same information from many angles to improve the legitimacy of the outcomes of the investigation. The following sections outline the specific methods used in gathering data for this investigation:

Interviews

Prior to the administration of questionnaire, an appointment was made with the concerned research participants. Street and shop traders were interviewed during working hours at their premises. Since the majority of street traders were fluent in English, the researcher did not need the assistance of an interpreter. However, assistance was sought when it came to traditional healers as the majority of them spoke *isiXhosa*.

According to their convenience, traditional healers were interviewed either at their home (mostly) or during workshops. For those who were interviewed at their practice place, the researcher and the interpreters (provided by CapeNature) had to comply with traditional practitioner beliefs and rules. For example, the research team had to leave their shoes outside the practice room. Pictures of plant species had to be taken with the consent of the stakeholder. Some traditional healers, mostly in Grabouw, invited the research team to visit their medicinal plant home gardens during this process. For those who chose to be interviewed during pre-defined workshops, both researcher and the interpreter ensured that the other stakeholders were kept away during the interview. This was for the comfort and privacy of the interviewee and also to prevent the views of the interviewee from influencing other informants.

It is worth noting that a workshop involving the researcher and interpreters was held to explain the contents of the questionnaire prior to the commencement of the fieldwork. In addition, as social science researchers are frequently blamed for not only informing the participants on the research question, but also for not affording them an opportunity to decide whether or not to contribute to the research (ethical issues) (Beauchamp *et al*., 1982), a prior informed consent was sought from all participants involved in the current study. Despite their prior consent, some informants refused to answer certain questions and the research team respected their views.

Personal observations

Personal observations allowed legitimizing, rejecting or readjusting information that was given by the informants. For example, in some cases there was a divergence between the price of the species given by the respondent and that paid by customers in the presence of the researcher. The price paid by the customer was often higher and this information was adjusted at the scene. Those prices varied also according to the customer's dress code: smart, ordinary or causal. In addition, the researcher's personal observations provided useful insight into the existing relationship between resource users and conservationists. In fact, during workshops, which gathered conservationists from CapeNature and local communities, issues of access to protected areas were often the main points of discussion raised by resource users.

Literature review

Relevant literature on the use and trade of medicinal plants worldwide, in Africa and in South Africa was assessed to understand the importance and the meaning of medicinal plants in the provision of human healthcare needs and income generation. Most importantly, literature review was helpful in identifying some species of plants, especially those sourced from other provinces of South Africa.

1. 6. 3. Sampling procedure

Sampling is the process of selecting observations (informants) who would be interviewed in a given study. There are mainly two types of sampling methods in social sciences (Babbie *et al*., 2001): probability sampling and non-probability sampling. Probability sampling is mostly used for selecting large and representative samples, while non-probability sampling applies when only little or no information exists about the individuals to be surveyed (for example, list of all homeless persons).

In the Cape Peninsula, records of the the number of traditional healers, collectors and traders of medicinal plants are lacking. This lack was observed during the pilot study. Indeed, the representatives of traditional healers did not know the number of people practising as traditional healers in their respective communities. This also applied to Rastafarians. Moreover, in Grabouw, a municipality councillor acknolowdeged the lack of registration record on traditional healers. These foregoing constraints necessitated the selection of non-probability sampling

method as the most suitable in gathering data for this study. "Snowball" sampling technique was particularly used in locating traditional healers and collectors. This technique is used when the members of a population are difficult to locate (Babbie *et al*., 2001). It is implemented by collecting data on few individuals of a target population that can be located, and then asking those individuals to provide the necessary information to locate other members of their community that they might know. On the other hand, as there is only a few number of medicinal plants traders in the Cape Peninsula, the majority of them (that is, street or shop traders) who were found in the study area were interviewed. However, three medicinal plant traders refused to be interviewed for the reasons outlined in the first paragraph of section 6.5.

1. 6. 4. Species identification

During the survey of trading places, pictures were taken and native species names were recorded either in *Afrikaans* or *isiXhosa*. Pictures taken were compared and contrasted with those in literature on South Africa's medicinal plants (e.g., vanWyk *et al*., 2000; Watt and Breyer-Brandwijk, 1962; Hutchings *et al*., 1996). Recorded local names were cross-checked with relevant literature to find out botanical names. This was done according to the geographic provenance of the species, conditions treated and the part used. For the most used species harvested within the Western Cape Province, samples were collected with the assistance of informants and brought to Kirstenbosch and Cape Vegetation Survey for identification.

Medicinal plant species were organized according to the frequency of mention by the informants. Three lists of species were produced: (1) most traded/used species in the Cape Peninsula; (2) Rastafarians' most traded/used species; and (3) traditional healers' most used species of medicinal plants. The difference in healing practices between traditional healers and Rastafarians and the sources of supply of traded/used medicinal plants was the main reason for splitting of the main list (1).

1. 6. 5. Data coding and analyzing

A codebook, describing the locations of variables and attributes composing each variable, was constructed. All answers from the questionnaire were converted into either numerical or categorical codes according to the similarity of the respondents' answers (coding process). Statistical analyses were performed using Statistica 8. Quantitative data were expressed as mean

± standard deviation, percentages and frequencies. As the variables were not normally distributed like in most qualitative studies, non-parametric tests were performed to detect any difference among variables. These statistical tests included Pearson Chi-square, Mann-Whitney U, Kruskal-Wallis (generalisation of Mann-Whitney U test) and Spearman r-tests. Pearson Chi-square was used to detect differences between categorical variables such as motivation for involvement in medicinal plants-related activities and ethnicity. Mann-Whitney U-test helped to compute comparisons between one continuous variable with a categorical variable with two attributes such as the frequency of harvesting and residence status. Difference between a categorical variable with more than two attributes and a continuous variable like the involvement category in the trade of medicinal plants and income generated from the trade was detected by using Kruskal-Wallis-test. Finally, Spearman r-test was used to compute correlation between two continuous variables such as income generated from the trade and the age of the respondent. It is worth noting that, as income and age were recorded as interval, transformations were necessary prior to performing statistical tests (e.g., <R500, R501-R1000 were transformed into 1 and 2, respectively).

1. 7. Significance and contribution of the study

Local communities' participation in conservation is now part of most conservation agenda and their knowledge on resources management has been acknowledged (Cunningham, 2001). As a result, biologists have called for an alliance between indigenous people (resource users), conservation organizations and the government for a mutual effort to overturn the ongoing biodiversity loss (Wild and Mutebi, 1996). Cunningham (2001) is one of the many conservationists who has recognized this central role of local people in the effective conservation of useful plant species. He has pointed out three main reasons for resource users' involvement. Firstly, the scarcity of useful plants is captured by resource users such as traditional healers, craft workers and commercial harvesters long before any conservation biologists could do so. Therefore, resource users' knowledge provides a shortcut, saving time and money, and enables biologists to monitor key species. Secondly, dialogue with resource users is crucial for developing conservation and management proposals intended to have a successful impact on the ground. Finally, a participatory approach enables one to identify different user groups because rural communities are likely to be complex networks today than previously when communities

were homogenous. Rural communities are often stratified along power, wealth, knowledge and gender relationships. Specialist interest groups involved in harvesting a specific resource such as medicinal plants can have a direct interest in maintaining this resource and prevent behaviour or activities that can compromise the supply in the future. That is why a study of this nature, which investigates not only ecological aspects (species in trade/use), but also attempts to understand the socio-economic conditions fueling the involvement of stakeholders in the trade/use of medicinal plants, is necessary for effective resource management and conservation.

This study is aimed at contributing knowledge to the little understanding of the trade and the use of medicinal plants in the Cape Peninsula. For example, it is expected to reveal species in trade and their conservation status, socio-economic profile of stakeholders and opportunities for and challenges to the sustainable management of medicinal plants in the Cape Peninsula. The investigation intends to provide a list of species in need of an urgent conservation and management attention.

1. 8. Thesis structure

The first chapter gives a background to the research problem, study area and outlines the objectives to be addressed. It also highlights the importance of medicinal plants in providing not only primary healthcare needs, but also as source of income to rural and urban communities. Chapter 2 looks at the global market for medicinal plants, factors leading to the dwindling of these crucial natural resources and global initiatives undertaken so far to overturn the ongoing depletion of medicinal plants worldwide.

Chapters 3, 4 and 5 contain the results gathered from the questionnaire that were administrated to the 13 surveyed locations in the study area. More specifically, chapter 3 gives an overview of the most traded/used medicinal plants in the Cape Peninsula. Parts of plant used, sourcing regions, harvesting frequencies and seasons, financial value of traded species and their conservation status are dealt with in this chapter. The observed results are discussed with consistent trends in medicinal plant trade observed in other regions of the world as well as in South Africa. Chapter 4 deals with social, cultural and economic attributes of stakeholders that influence the trade and also justify their involvement in medicinal plants. Similarly, the results are discussed as in the preceding Chapter 3. Constraints and opportunities for the sustainable management of medicinal plants in the Cape Peninsula are presented and discussed in Chapter 5.

Finally, Chapter 6 brings together all the findings of the investigation and ends by making some recommendations to target conservation organizations, local government and also resource users in the Cape Peninsula and surrounding areas.

Chapter 2: Medicinal plants trade, threats and approaches to conservation

2. 1. Introduction

Historically used as raw materials in traditional medicine systems, especially by traditional health practitioners, medicinal plants have entered the formal and informal markets worldwide (Cunningham, 1993; Laird, 1999; Bussmann *et al*., 2007; Van de Kop *et al*., 2006; Lange, 2006; Hamilton, 2004). Medicinal and aromatic plants are increasingly being used in pharmaceutical and natural resource based-product industries for the manufacture of drugs and other commodities (Laird, 1999). The informal market is also growing and more and more stakeholders are attracted (Mander, 1998). A number of commercial harvesters, mostly unemployed and from poor social strata, are generating income from the informal trade of medicinal plants. However, in both formal and informal markets, the bulk of traded material is sourced unsustainably from wild stocks (Kuipers, 1997; Laird, 2005). This unsustainability, combined with the expanding local and international market put not only medicinal plant species at risk of extinction, but also healthcare and economies of most vulnerable people (Hoareau and DaSilva, 1999; Hamilton, 2005).

The aim of this second chapter is to review: (i) the global market of medicinal and aromatic plants; (ii) the driving factors leading to medicinal plant loss and/or depletion; and (iii) to explore opportunities for the sustainable management of medicinal plants.

2. 2. The pharmaceutical industry

It is well established that biological diversity has played and continues to play an important role in the pharmaceutical industry. However, the market size, trade volumes and values, plants used and their production, ecological and socio-economic impacts of the trade, remain poorly documented (Laird and Kate, 1999). Volumes of medicinal and aromatic plants (MAPs) material on global market are difficult to quantify due to the lack of records and informal character of the trade, especially in developing countries. This lack of transparency often makes it difficult to identify the source countries, mostly in the herbal medicine industry. Nevertheless, in some regions, such as Europe, USA, China and India, the trade is organized and some figures are available.

Despite the inconsistency of market figures in literature, mostly due to the valuation methodology used by the authors (Kumar, 2004), the general trends show an important growth in value for the pharmaceutical industry. For example, in 1998, annual global sales of medicinal drugs were about US$300 billion (IMS Health, 2007). This estimate included sales of natural product-derived drugs, semi-synthetic and synthetic drugs. However, the financial value of drugs from natural origin is problematic and varies from one author to another (Laird and Kate, 1999). In 1976, for example, the market of plant-derived drugs was estimated at US$5 billion of global pharmaceutical sales. A few years later, this estimate increased to US$8-20 billion per year (Laird and Kate, 1999). With the growing global demand, these figures may have changed. An illustration of this growth is given in Table 2a.

Table 2a: Global pharmaceutical sales, 1997-2004

Global Sales US$B	1997	1998	1999	2000	2001	2002	2003	2004
Total world market	$289	$297	$332	$357	$387	$426	$493	$550*
Growth over previous year		7%	11%	10%	12%	9%	10%	7%

*Source: IMS Health Global Pharma Forecast (includes IMS Audited and Unaudited Markets). All information was current as of February 15, 2005.

The market structure for pharmaceuticals has been divided into five major blocks by the International Medical Statistics (IMS)[1] Health (Table 2b). These blocks consist of North America, Europe, Latin America, Japan, Asia (excluding Japan) and Australia and Africa. North America (USA and Canada), Europe and Japan are considered as the major market for pharmaceuticals. In 2005, these regions accounted for 88% of audited worldwide pharmaceutical sales. Asia and Africa and Australia, and Latin America accounted respectively for 8.2% and 4.2% of global sales for the same year.

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[1] IMS is the world's leading provider of market intelligence to the pharmaceutical and healthcare industries. With more than 50 years of industry experience, IMS operates in more than 100 countries.

Table 2b: Global pharmaceutical sales by region, 2005

World audited market	2005 sales (US$ B)	% Global sales	% Growth Year-over-Year (Constant $)
North America	265.7	47.0	5.2
Europe	169.5	30.0	7.1
Japan	60.3	10.7	6.8
Asia, Africa and Australia	46.4	8.2	11.0
Latin America	24.0	4.2	18.5
Total IMS Audited*	565.9	100%	6.9%

Source: IMS MIDAS®, MAT Dec 2005. All information was current as of February 27, 2006.
*Excludes unaudited markets. Sales cover direct and indirect pharmaceutical channel purchase in U.S. dollars from pharmaceutical wholesalers and manufacturers. The figures above include prescription and certain over-the-counter data and represent manufacturer prices. Totals may not add due to rounding.

The US market remains by far the most important. The projected sales for the North American block (USA and Canada) for the year 2006 were estimated at US$340.15 billion. The US mark*et al*one accounted for US$330 billion. Japan, the second largest international market was forecast to grow 5-6%. In Europe, the five leading markets (France, Germany, the UK, Italy and Spain) combined were projected to grow 3-4%, mostly due to the increased demand from an ageing population. In emerging countries such as China and India, markets were projected to grow more than 10% for the same year (2006). The high growth of China and India is explained by their expanding economies and broader access to medications, which is stimulated by the abundance of generics (IMS Health, 2007). The major companies involved in the discovery and development of drugs are from the Western world. In 2004, for example, the top 20 pharmaceutical companies were from seven industrialized countries and accounted for about 60% (US$332.7 billion) of the US$550 billion global annual sales (Busch and Kern, 2005). Among these companies, 10 were from USA, seven from Europe and three from Japan (See Busch and Kern, 2005).

2. 3. Medicinal and aromatic plants (MAPs) industry

By contrast to pharmaceutical drugs, often made of a single isolated active compound, botanical medicines are produced from whole plant materials and contain a large number of constituents and active ingredients believed to work in synergy (Laird, 1999). This industry consists mainly of phytomedicines (the amount of active chemical compounds is specified),

herbal remedies (no specification), nutraceuticals (food ingredients or products that are consumed for their therapeutic benefit) and cosmeceuticals (cosmetic and personal care products that are used for their therapeutic benefits). Depending on the level of processing, herbal/botanical medicines are sold in various forms. These include capsules, tablets, herbal teas, extracts, tinctures, dried and fresh herbs.

2. 3. 1. Overview of the international market for medicinal and aromatic plants

The international market for botanical medicines is vast and complex. Many small and medium-sized companies take part in this industry. The complexity of this industry makes data on sales difficult to analyse. Some companies do not even share data on sales and others do not even record sales (Laird, 1999). In addition, many terms are used to designate products derived from plants (nutraceuticals, dietary supplement, vitamins, phytomedicines, herbal remedies, raw botanical material, bulk ingredients, health food and natural food). This diversity of terms makes the comparison across regions, as well as studies difficult (Laird, 1999).

During the period 1991-2003, an annual average of 467,000 tons of medicinal and aromatic plants, valued at US$1.2 billion was exported globally (Lange, 2006). Like for the pharmaceutical industry, few countries dominate the global trade. Eighty percent of annual global import and export were allotted to only 12 countries (Table 2c), with temperate Asian countries accounting for 41% and 48% of annual global imports and exports, respectively.

Regarding single countries, Hong Kong was the highest importing country with an annual import of 59,950 tons. It was followed by the United States of America (51,200 tons), Japan (46,450 tons) and Germany (44,750 tons). On the export side, China was by far the leading exporter with an annual global export of 1,550,600 tons. It was followed by Hong Kong, India, Mexico and Germany. Egypt and Morocco were the leading African exporter countries with 11,800 tons and 8,500 tons, respectively.

Table 2c The 12-leading medicinal and aromatic plant importing and exporting countries

Country of import	Quantity [tonnes]	Value [US$]	Country of export	Quantity [tonnes]	Value [US$]
Hong Kong	59,950	263,484,200	China	150,600	266,038,500
USA	51,200	139,379,500	Hong Kong	55,000	201,021,200
Japan	46,450	131,031,500	India	40,400	61,665,500
Germany	44,750	104,457,200	Mexico	37,600	14,257,500
Rep. Korea	33,500	49,889,200	Germany	15,100	68,243,200
France	21,800	51,975,000	USA	13,050	104,572,000
China	15,550	41,602,800	Egypt	11,800	13,476,000
Italy	11,950	43,006,600	Bulgaria	10,300	14,355,500
Pakistan	10,650	9,813,800	Chile	9,850	26,352,000
Spain	9,850	27,648,300	Morocco	8,500	13,685,400
UK	7,950	29,551,000	Albania	8,050	11,693,300
Malaysia	7,050	38,685,400	Singapore	7,950	52,620,700
Total	320,550	930,524,400	Total	368,100	847,980,800

Source: Lange, 2006.

For the same period 1999-2003, the USA, Germany and Hong Kong were the three main trading centres (and may still be today). All these three countries showed both high import and export quantities. In the North American region, the USA acted as the main trade centre. India, China, Azerbaijan, Mexico and Egypt were the main suppliers of the USA. In contrast to import, 44% export was allotted to American countries: 26% Canada; 7% to Mexico and 10% to South American countries. Other important export market for the USA included Germany (17%), Republic of Korea (12.5%) and Japan (10%). Germany imported its raw materials from at least 142 countries and exported them to 147 countries. Bulgaria acted as its most important supplier, while Austria was the most important buyer. Hong Kong, the third most important global centre, imported 80-90% of its raw material from China and 86% of its exports were destined to Southeast-Asian countries (Lange, 2006).

2. 3. 2. Number of species in trade and means of supply

Similar to other domain of this industry, there is no reliable information on the exact number of species in trade. For example, there are no or only few reliable trade data on the number of species used worldwide in areas like cosmetics, beverages, or aromas (Lange, 2004). However, it is estimated that between 70,000 and 72,000 species are used in folk and modern

medicines worldwide (Farnsworth and Soejarto, 1991; Schippmann *et al*., 2006)). In India, for example, over 8,000 plant species are reported to be in use in both traditional and modern medicine (Van De Kop *et al*., 2006). Among the 2,000 medicinal and aromatic plants available in European market, 1,543 are available in German market. Based on the importance of Europe as a sink for medicinal plants traded from all regions of the world, it has been estimated that 3,000 species are in trade worldwide (Schippmann *et al*., 2006).

It is well established that the bulk of medicinal and aromatic plants is harvested from the wild populations (Kuispers, 1997). In Germany, for example, among the 1,543 species in trade, only 50-100 are under cultivation (Schippmann *et al*., 2006). In China, where about 5,000 species are used for medicinal purposes, only 100-250 of the 1000 commonly traded/used are under cultivation (He and Sheng, 1997). This prevalence of wild collection is also occurring in other countries worldwide (WHO/IUCN/WWF, 1993). Regrettably, with the increasing international demand, combined with expanding local and regional markets, many medicinal and aromatic plant species are facing extinction threat. In line with this, Schippmann and others (2006) estimated about 15,000 of the 72,000 medicinal plants in use to be threatened at least to some degree.

2. 4. Overview of the southern African botanical industry

Southern African flora is well known for it diversity richness and endemism. Over 22,000 native and 900 naturalised plant species are found within this region encompassing South Africa, Namibia, Botswana, Swaziland and Lesotho (McGaw *et al*., 2005). This flora, contributing to 10% of the earth's flora, is believed to harbour the highest concentration of threatened plants in the world (Marshall, 1998). Approximately 4,000 species are used for medicinal purposes and some of these species are threatened by over-harvesting (Arnold *et al*., 2000; McGaw, 2005).

Despite the lack of statistics in some countries within the region, it is believed that trends observed in South Africa are similar to other countries of the region (McGaw *et al*., 2005). The industry for therapeutic plants in the region is divided into two market systems: the informal and the formal markets. The informal market consists of 400,000 to 500,000 traditional healers, which dispense herbal remedies to a market that constitutes between 50 and 100 million consumers. Between 35,000 and 70,000 tons of plant materials, valued at between US$75 and US$150 million, are consumed annually. Over 1,000 species are actively traded in the region and

several hundred thousands of people generate income from this informal industry (Mander and Le Breton, 2005; Mander and Le Breton, 2006).

The formal market, valued at US$25 million, exports between 5,000 and 10,000 tons of material from the region. About 50 species are actively traded in the formal market (Mander and Le Breton, 2005; Mander and Le Breton, 2006). This market is divided into two components. The first component comprises local consumers, with high income, who tend to buy finished products. The second consists of export buyers, who prefer raw or value-added ingredients for onward sale to manufacturers and processors located in developed countries. The local market is mostly dominated by exotic species such as Echinacea, ginseng and St John's Wort. However, indigenous species such as Cancer bush (*Sutherlandia frutescens*), Geranium (*Pelargonium spp.*), African potato (*Hypoxis Hemerocallidea*) and some herbal teas, including Rooibos (*Aspalathus linearis*), Buchu (*Agathosma crenulata, A. betuilna*) and Honey-bush (*cyclopia spp.*) have started supplying this market. The export market is dominated by species with long history of use such as the Devil's Claw (800 tons per year) and Aloe (700 tons per year). Other species such as, Hoodia (*Hoodia gordonii*) and Baobab (*Adansonia digitata*), Marula (*Scleorocarya birrea*) and Kalahari melon (*Citrus lanatus*) are exported to nutraceuticals and cosmeceuticals industries.

Several factors explain the steady growth of both local informal and formal markets. First, the local informal market for therapeutic plants is fuelled by the cultural significance of traditional medicine and HIV/AIDS pandemic, which is high in the region and responsible for increasing the use of species believed to boost immune system such as African potato. The export markets follow the global trends towards alternative medicine (Mander and Le Breton, 2005).

2. 5. Main drivers for medicinal plant species loss

The following section addresses factors and activities that lead to the loss of biodiversity, especially medicinal plant resources

2. 5. 1. Habitat degradation and land transformation

The most important threat to the earth's biodiversity loss is habitat transformation and degradation by anthropogenic activities. It is now being established that the distribution of

species on the earth is becoming homogenous (Millennium Ecosystem Assessment, 2005). One of the ways of doing so is the conversion of natural habitats with few human selected crop species. This conversion of natural habitat by few selected crops has reduced the availability of other resources such as medicinal plants. Currently, cultivated systems (crop production, shifting cultivation, livestock production and freshwater aquaculture), cover one quarter of the earth's terrestrial surface (Millennium Ecosystem Assessment, 2005). In South Africa, cultivation, grazing, urban development, afforestation, mining, dams and alien species are the main threats to biodiversity (Wynberg, 2002). An estimate of 16.5% of South African's land cover is transformed and a further 10.1% is degraded (Reyers *et al*., 2001). Cultivation is the largest threat with coverage of 12.2% of South African land (Fairbanks *et al*., 2000). Fynbos biome, which harbours many medicinal plant species, accounts for 30% of transformed and degraded lands (Fairbanks *et al*., 2000). In the Eastern Amazonian forests, logging is the main cause of changes in forest composition and structure. These changes have affected the availability of medicinal plants as well as other economic plants on which indigenous communities depend (Shanley and Luz, 2003).

2. 5. 2. Population growth, unemployment and poverty

A high population growth often leads to increased demand for natural resources, including medicinal plants. In Africa, where the growth rate is 5.1% per annum, up to 80% of the population make use of traditional medical health systems regardless of their income and educational level (WHO, 2006; Cunningham, 1993). With a high unemployment rate, combined with an inadequate provision of modern health facilities, traditional health systems are often the only option to the majority of poor people. In South Africa's homeland areas, for example, the ratio of medical doctor to total patient is 1:17,400. On the other side, traditional healer to patient ratio is 1:700-1,200. In the Kwahu District in Ghana, for every western medicine doctor there are 21,000 people, compared to one traditional practitioner for 224 people (Hamilton, 2004; Rukangira, 2004). Thus, there is no doubt of the role of traditional practitioners in the provision of primary healthcare.

In addition, traditional healers are no longer the only harvesters of plants. Commercial gatherers have entered the informal medicinal plant industry. Increasing demand in local and international market leads to the increase of collectors as well as wild harvested quantities. Ring-

barking, uprooting or cutting down whole plants, which are unsustainable and destructive methods, are common methods with commercial harvesters whose main aim is income generation. In KwaZulu-Natal, up to 3,000 people, mostly women, derive an income exclusively from trading medicinal plants (Mander, 1998). It is worth noting that although the medicinal plant industry plays an important role in empowering a large number of poor people, the increase in number of role players and quantities harvested may result in the depletion of natural assets and subsequent problems for primary healthcare.

2. 5. 3. Decline of customary controls

Local knowledge on the use of the species is declining and has been already lost in some communities. In the past, the sustainable use of medicinal plants was facilitated by inadvertent controls and some intentional conservation practices (Cunningham, 1993). Pressure on medicinal plant resources was regulated through taboos, seasonal and social restrictions, protection at graves and the nature of equipment used to harvest the plants. For example, in South Africa and Swaziland, menstruating women were not allowed to collect medicinal plants. This was believed to reduce the healing power of the plants (Cunningham, 1993). Women practised as diviners, while men as herbalists. This reduced the number of collectors. Conversely, today, many women are involved in the collection and trade of medicinal plants (Mander, 1998).

Protection of vegetation at grave sites, religious beliefs and seasonal restrictions on collection were common intentional regulation strategies. Species such as *Alepidea amatymbica*, *Siphonochilus aethiopicus* and *Agapanthus umbellatus* were harvested only in the summer months in Swaziland and South Africa (Cunningham, 1993). Today, *Alepidea amatymbica* is among the most commonly available species in *Umuthi* shops (shops selling medicinal plants) at Witwatersrand market (Williams *et al*., 2000).

2. 6. Approaches to medicinal plant conservation

In response to the declining of medicinal plant resources, governments, non-govermental organizations and other stakeholders, through the world, took some initiatives to overturn the over-exploitation of medicinal plant resources. This section deals with these worldwide initiatives.

2. 6. 1. Global biodiversity conservation initiatives

Presently, most literature has recognized that biological diversity, including species, ecosystems and genes, is under threat (Hamilton, 2005; Millennium Ecosystem Assessment, 2005). The loss of species has always occurred as a natural phenomenon, but the pace of extinction has accelerated dramatically as a result of human activity. This irreversible extinction crisis is believed to be greater than the natural disaster that wiped out the dinosaurs 65 million years ago (CBD, 2000). Given our dependence on biodiversity, especially rural communities, a number of initiatives have been taken to achieve conservation and sustainable use of natural resources. Among these is the Convention on Biological Diversity (CBD). This convention addresses specifically the ecological, socio-economic and equity as the basis for conservation and sustainable use of biodiversity (CBD, 1992).

Focusing on medicinal plants, the 1993 WHO/IUCN/WWF Guidelines on the Conservation of Medicinal Plants (WHO/IUCN/WWF, 1993) and the 2003 WHO Guidelines on Good Agricultural and Collection Practices (GACP) for Medicinal Plants (WHO, 2003) provide general guidance and principles for the sustainable use of medicinal and aromatic plants. Governments, medicinal plant industries and other stakeholders, including collectors are provided with specific guidance on sustainable harvesting practices. For example, governments are required to:

- regulate the collection of medicinal plants from the wild by imposing permits for the commercial collection of certain named plants that are believed to be in danger;
- take into account the part of the plant used, the capacity of the plants to regenerate after harvesting and the harvesting practices;
- wherever possible, any collection should be done by trained people, adopting good management and a rotation system, and suitably supervised;
- respect the ethical, legal and social interest of all stakeholders while conceiving regulation frameworks;
- prohibit the collection from the wild of threatened medicinal plants, their possession and trade, except for propagation purposes;
- prohibit land-owners from collecting threatened species on their land;
- provide traditional health practitioners with alternative species with similar active compounds, when a species is banned; and

- to control trade in medicinal plants and their products, especially internationally, by making use of the appendices of Convention on International Trade in Endangered Species (WHO/IUCN/WWF, 1993).

In addition, governments are requested to encourage the cultivation of medicinal plants, especially rare, endangered and overexploited species. Protected area managers are requested, in conjunction with local communities, to develop management plans that simultaneously allow the conservation and the utilization of medicinal plants by local people within protected area boundaries. Although considered out of date, the 1993 guidelines is the only document addressing the ecological and socio-economic issues related to the conservation and sustainable wild harvesting of medicinal plants.

2. 6. 2. Medicinal plant cultivation

To supply the expanding local and international markets, cultivation is believed to be the best source of supply. However, to date, the bulk of medicinal plants traded or used in traditional medicine systems worldwide is sourced from wild stocks (Kuipers, 1997). For example, in 1994, where the demand for medicinal plants in China was 1,600,000 tons, the output of cultivated material was between 300,000 to 400,000 tons. This gap would be made up from wild harvested material (Kuipers, 1997). Yet, among the 1,543 species of medicinal and aromatic plants traded in Germany, only 50-100 are exclusively sourced from cultivation (Schippmann *et al.*, 2006). Based on certain available figures, Schippmann *et al.* (2006) concluded that medicinal and aromatic plants under cultivation worldwide are less than 1% of the total plants used.

The emerging question one may ask is "Why are so few species cultivated and so many others are not"? One of the answers would be based on cultural considerations. Cultivated species are sometimes considered qualitatively inferior to wild harvested species. For example, in a survey undertaken in the Amatola region of South Africa, on the perception on cultivated species, 24% of the respondents felt that cultivated species were less effective than wild ones (Wiersum *et al.*, 2006). In Botswana, traditional medicine practitioners reported that cultivated material lack power and was unacceptable (Cunningham, 1993). Interestingly, scientific studies partially support these cultural beliefs. In line with this, He and Sheng (1997) found a difference in chemical constituents of *A. lancea* collected from four different sites in Jiangsu Province in China. Schippmann and colleagues (2006) argued that, "medicinal properties in plants are mainly

due to the presence of secondary metabolites which the plants need in their natural environment under particular conditions of stress and competition and which perhaps would not be expressed under monoculture conditions". However, cultivation has pharmacological advantages compared with wild collection. Wild collection plants vary in quality and composition, due to environmental and genetic differences (WHO/IUCN/WWF, 1993). Under cultivation, this variation is reduced since the plants can be grown in a medium with similar climate and soil. Furthermore, the plants can be harvested at the right time.

In terms of the market, cultivation provides a number of advantages over wild collection of medicinal plants:

- wild collection often offers adulterated material, sometimes harmful, cultivation on the contrary provides reliable botanical identification;
- wild collection provides variable volumes and an irregularity of supply, cultivation guarantees a steady supply;
- wholesalers and pharmaceutical companies can agree on volumes and prices over time with growers; and
- cultivation allows controlled post-harvest handling, quality control and the product standards can be adjusted to international regulations and consumer preferences (Schippmann *et al.*, 2006).

Despite these advantages, cultivation is not always technically feasible. Biological and ecological requirements (such as slow growth rate, soil requirement, interactions with pollinators and other species, low germination rates and susceptibility to pests) are difficult to meet. These biological and ecological requirements, combined with social factors affect the economic viability of medicinal plant cultivation (Schippmann *et al.*, 2006). Therefore, sustainable harvesting from wild stocks is recommended as the best option, especially when cultivation is not possible, for long-term benefit for the environment, healthcare and economies (Hamilton, 2005). However, the realization of sustainable collection of wild resources is also facing both anthropogenic and ecological challenges. Indeed, knowledge about sustainable harvest rates and practices is lacking for most of the wild harvested plant species (Schippmann *et al*., 2005). In some instances, access to natural resources is often open to everyone. This open-access nature of property makes it difficult to implement and monitor some sustainable harvesting strategies such

as annual harvest quotas, seasonal or geographical restrictions and restrictions of harvest to particular plant parts or size. Thus, apart from overcoming resources knowledge deficit, strong resource tenure and the provision of resource users with the required harvesting skills, are some of the pre-requisites for the effective sustainable supply of resources from wild stocks (Schippmann *et al.*, 2005; Hamilton *et al.*, 2006).

2.7. Concluding remark

Medicinal plants represent an important asset not only in providing primary health care, but also in providing income to rural and urban poor communities, herbal and pharmaceutical industries, as shown throught the above literature. However, although habitat transformation is pointed out as the main driver of biodiversity loss, including medicinal plants, population growth socio-economic conditions and the decline of customary controls contribute also to the dwindling of medicinal plant resources. Documenting the trade/use of medicinal plants, understanding the socio-economic conditions of resource users and their perceptions on cultivated species are believed to be the starting point for the sustainable management of medicinal plants.

Chapter 3: Overview of medicinal plants traded/used in the Cape Peninsula

3. 1. Introduction

Apart from being the main ingredients in traditional medicine, medicinal plants are increasingly being harvested for economic purposes. Harvesting from the wild, which is the main source of medicinal plants, is causing depletion and extinction of wild stock populations (Cunningham, 1993; Hoareau and DaSilva, 1999; Schippmann *et al*., 2005; Dold and Cocks, 2002). For example, economic harvesting has depleted populations of *Ocotea bullata*, *Curtisia dentata* and *Warburgia salutaris* from southern African forests and also eradicated the wild populations of *Monanthotaxis capea* in Ivory Coast (Cunningham, 1993; Geldenhuys, 2004). Accordingly, apart from sustaining harvest levels from the wild populations, domestication and cultivation have been proposed as alternatives to overturn further losses and also to sustain the increasing demand for medicinal plants (Cunningham 1993; WHO/IUCN/WWF, 1993; Geldenhuys, 2004; Canter *et al*., 2005; Keirungi and Fabricius, 2005; Schippmann *et al*., 2006; Wiersum *et al*., 2006).

However, the implementation of these alternatives is constrained by the documentation of markets. One of the ways for documenting the trade of natural resources is through ethnobotanical surveys. The survey of market places, harvesting places and households provides valuable information relating not only to species in trade/use, but also species' geographical distribution, impact of harvesting on target species and resource users identification (Cunningham, 2001; Hamilton, 2005). Only after assessing trading places that priority species, those in need for management and conservation attention, are accurately identified.

Consequently, this chapter attempts to document the trade of medicinal plants in the Cape Peninsula. Research questions relevant to adresssing this first objective of the study are: (1) What are the most traded/used species of medicinal plant in the study area and for which parts are they traded? (2) Where are the source regions for these traded/used species of medicinal plants? (3) What are the frequencies and seasons of harvesting? (4) What is the financial value of these species of medicinal plants? (5) Finally, what is the conservation status of the traded/used species of medicinal plants? These research questions were tackled by interviewing street traders, shop traders, collectors and traditional healers at trading and practice places. The

methodology used in gathering data to adresss these reaserch questions is described in Chapter One, section 1.6.

3. 2. Results

The outcomes of this investigation are presented in the following sub-sections under various forms, including tables, graphics and pictures. The most traded/used species are ranked according to the frequency of mention. Sourcing regions for material sold/used, frequencies of harvesting and harvesting seasons are presented in histograms alongwith their percentages. Prices for pecies are computed with their means, standard deviations, medians, modes, minimum and maximum values.

3. 2. 1. The plants traded/used

Despite the difficulty of acquiring good quality specimen, especially for species originating outside the study area, 75% of the 167 inventoried species were accurately identified. As the respondents were only asked to nominate the 10 most frequently traded/used species, the exact number of medicinal plants traded in the Cape Peninsula might therefore be higher than the reported figure. The 86 most commonly traded/used species of medicinal plants, which were mentioned by at least two respondents, are listed in Table 3a. Table 3a also shows that species from *Helichrysum* genus are the most traded/used species in the Cape Peninsula. Among this genus, *Helichrysium petiolare* (Picture 1) was the most traded species. These most commonly traded/used species are followed by *Agathosma spp.* (Picture 2), *Tulbaghia spp.* (Picture 3), *Hypoxis spp.* (Picture 4), *Alepidea spp.* (Picture 6) and some members of the Family Asphodelaceae such as *Aloe rupestris* (Picture 5).

Several distinct botanical species were undifferentiated among the informants. For example, *Agathosma betulina* and *Agathosma crenulata* were both commonly known as Boegoe or Buchu. Similarly, *Aloe spp.*, *Haworthia attenuate*, *Gasteria bicolour* and *Gasteria croucheri* were all known as Intelezi, Ikhala or *Aloe* (Tab. 3a).

Table 3a: Cape Peninsula's most traded/used medicinal plants in order of frequency[*]

No.	Fre-quency	Vernacular/common name	Botanical name	Part (s) used
1	75	Kooigoed; hotnots-kooigoed; impepho	*Helichrysum spp.*	Leaf & stem
2	56	Boegoe; Buchu	*Agathosma betulina; A. crenulata*	Leaf & stem
3	45	Wild garlic; Umwelela; Isivimbampunzi	*Tulbaghia violacea; T. alliacea*	Rhizome
4	43	African potato; iNongwe; iNkomfe; iLabatheka	*Hypoxis hemerocallidea; H. colchicifolia*	Corm
5	38	Intelezi; ikhala; aloe	*Aloe ferox; A. perfoliata; A. plicatelis; A. rupestris Haworthia attenuata; Gasteria bicolor; G. croucheri*	Leaf; whole
6	26	Kalmoes; iqwili	*Alepidea amatymbica; A. delicatula*	Rhizome; root
7	26	David root; Mayisake; Dawidjiewortel	*Cissampelos capensis*	Root
8	24	Cancer bush; Kanker bossie; keurkie	*Sutherlandia frutescens*	Leaf & stem
9	23	Bitterbos	*Chironia baccifera*	Leaf & stem
10	22	Rooiwortel; red carot	*Bulbine latifolia*	Rhizome
11	21	Umhlonyana; Wilde als	*Artemisia afra*	Whole
12	21	chithibunga	*Rhoicissus spp.*	Tuber
13	20	uMathunga	*Haemanthus albiflos H. sanguineus*	Bulb
14	16	Bergselery; wild selery	*Peucedanum galbanum*	Leaf & stem
15	15	Bloekom	*Eucalyptus spp.*	Leaf
16	14	uMaphipha	*Rapanea melanophloes*	Bark
17	13	isilawu	*Behnia reticulata*	Root
18	13	Ysterhoutoppe	*Dodonaea angustifolia*	Leaf & stem
19	13	Roosmaryn	*Rosmarinus officinalis*	Leaf
20	13	Bitter patat	*Sanseviera aethiopica*	Tuber
21	12	Bloublomsalie; Salie	*Salvia africana-caerulea; Buddleja salviifolia*	Leaf & stem
22	12	Lavender	*Lavandula angustifolia*	Leaf & stem
23	10	umredeni	*Drimia elata*	Bulb
24	10	Perdepis; ulathile	*Hippobromus pauciflorus*	Leaf & stem
25	10	Wilde dagga; klipdagga	*Leonotis leonurus*	Leaf & stem
26	10	Soethout wortel; sweet root	*Rafnia amplexicaulis*	Root
27	9	Moer bos	*Aristea africana*	Whole
28	9	Skilpad; isikolipati; ufudu	*Dioscorea sylvatica*	Tuber
29	9	umvuthuza	*Knowltonia bracteata*	Whole

*Frequency refers to the number of respondents who mentioned the plant species among their top 10 most commonly traded/used plant species.

Table 3a continued

30	9	umnonono; umnono	*Strychnos spp.*	Bark
31	8	inqwebeba; white onion	*Albuca setosa*	Bulb
32	8	Renosterbos(sie)	*Elytropappus rhinocerotis; Anthospermum spp.? Aspalathus spp.?*	Leaf & stem
33	8	Ag-dae-genees-bos	*Lobostemon fruticosus*	Leaf & stem
34	8	icimamlilo	*Pentanisia prunelloides*	Root
35	7	umagaqana	*Bowiea volubilis*	Bulb
36	7	uroselina	*Cinnamomum camphora*	Bark; leaf
37	7	Kruisement	*Mentha longifolia*	Leaf & stem
38	7	umkhwenkwe	*Pittorporum viridiflorum*	Bark
39	7	itshongwe	*Pachycarpus concolor*	Root
40	6	Slang blaar	*Acokanthera oppositifolia*	Leaf
41	6	Karmadik	*Cnicus benedictus*	Whole
42	6	velabahleke	*Cyrtanthus mackenii*	Bulb
43	6	Tiemie	*Helychrisum spp.*	Leaf & stem
44	6	umjelo; ujelo	*Rauvolfia caffra*	Bark
45	5	Wildewingerd	*Cliffortia odorata*	Leaf
46	5	Kaneelbol; kaneeltjies	*Eriospermum lanceolatum; Pelargonium triste*	Tuber
47	5	Kruidjie-roer-my-nie	*Melianthus major*	Leaf
	5	Voelent	*Viscum capense*	Stem
48	5	umthuma	*Solanum spp.*	Fruit; root
49	4	mlahleni	*Curtisia dentata*	Root; bark
50	4	Red onion	*Drimia spp.*	Bulb
51	4	iphuzi	*Gunnera perpensa*	Root
52	4	ixonya	*Kniphofia uvaria*	Root
53	4	umhlabelo	*Nidorella sp & Selago sp*	Root
54	4	umquma	*Olea europaea. Subsp. africana*	Leaf
55	4	Wynruit; vue	*Ruta graveolens*	Leaf
56	4	umafumbuka	*Sarcophyte sanguinea subsp. Sanguinea*	Bulb
57	4	Wild ginger; isiphepheto	*Siphonochilus aethiopicus*	Rhizome
58	4	Groenamara	*Vernonia oligacephala*	Leaf
59	4	isibharha; isibhaha	*Warburgia salutaris*	Bark
60	4	uvukwabafile		Root; bark
61	3	umkhanya-kude	*Acacia xanthophloea*	Bark
62	3	ipewula; iphewula; Elephant ear	*Cotyledon orbiculata*	Leaf
63	3	uvuma		Root
64	3	iMpinda bamshaye	*Rhoicissus tomentosa*	Tuber
65	3	umgxam	*Schotia spp.*	Bark; leaf
66	3	Katterkruie	*Stachys aethiopica*	Leaf & stem
67	3	imifingwane	*Stangeria eriopus*	Root
68	3	Witstorm; White storm	*Thesium lineatum*	Root
69	3	umkhuhlwa	*Trichilia spp.*	Root; bark

Table 3a continued

70	3	indonya		Rhizome
71	3	mlomo-mnandi		Root
72	3	Love root		Root
73	2	isindiyandiya	*Bersama lucens*	Root
74	2	Red storm	*Bulbine alooides*	Tuber
75	2	umahlabekufeni	*Croton gratissimus*	Root; leaf
76	2	Gibeleweni	*Croton sylvaticus*	Root
77	2	Wildepietersielie; wildparsley	*Heteromorpha arborescens*	leaf
78	2	isithithibala	*Ledebouria spp.*	Bulb
79	2	umnukane; uNukani	*Ocotea bullata*	Bark
80	2	inceba	*Polygala serpentaria*	Root
81	2	umthathi	*Ptaeroxylon obliquum*	Bark
82	2	idolo lenkonyana	*Rumex spp.*	Root
83	2	umkhamamasane	*Tabernaemontana ventricosa*	Root
84	2	umlungumabele	*Zanthoxylum capense?*	Bark
85	2	nkuphulane		Root
86	2	ungcana		Root

Picture 1: *Helichrysum petiolare* (Koegoed) on sale

Picture 2: *Agathosma betulina* (Buchu) on sale

Picture 3: *Tulbaghia spp.* (Wild garlic) ready for sale

Picture 4: *Hypoxis spp.* (African potato) on sale

Picture 5: *Aloe rupestris* (Intelezi) on sale

Picture 6: Rhizome of *Alepidea amatymbica* (Kalmoes) on sale

Difference in species preferences and ranking was observed between the Rastafarians and traditional healers (Tab. 3b & 3c). *Agathosma spp.*, *Helichrysum spp.*, *Tulbaghia spp.*, *Sutherlandia frutescens* and *Chironia baccifera* were the Rastafarians' five highly ranked medicinal plant species. Conversely, *Helichrysum spp.*, *Aloe spp.*, *Gasteria spp.*, *Haworthia attenuata*, *Hypoxis spp.*, *Rhoicissus spp.* and *Tulbaghia spp.* were the traditional healers' most used medicinal plant species. In addition, there was also a difference between the top ranked medicinal plant species in the Cape Peninsula and those reported in surveys undertaken in Mpumalanga and KwaZulu-Natal (Tab. 3d).

Table 3b: Rastafarians' most traded/used medicinal plants

No.	Fre-quency	Vernacular/common name	Botanical name	Part (s) used
1	46	Buchu; Boegoe	*Agathosma betulina; A. crenulata*	Leaf & stem
2	38	Kooigoed; hotnots-kooigoed; impepho	*Helichrysum spp.*	Leaf & stem
3	28	Wild garlic	*Tulbaghia violacea; T. allicea*	Bulb
4	24	Cancer bush; Kanker bossie; keurkie	*Sutherlandia frutescens*	Leaf & stem
5	23	Bitterbos	*Chironia baccifera*	Leaf & stem
6	23	African potato	*Hypoxis hemerocallidea*	Corm
7	22	Rooiwortel; red carot	*Bulbine latifolia*	Rhizome
8	21	David root; Dawidjiewortel	*Cissampelos capensis*	Root
9	16	Intelezi; aloe	*Aloe ferox; A. perfoliata ; A. plicatelis; A. rupestris Haworthia attenuata; Gasteria bicolor; G. croucheri*	Leaf; whole
10	16	Bergselery; wild selery	*Peucedanum galbanum*	Leaf & stem
11	15	Bloekom	*Eucalyptus spp.*	Leaf
12	13	Kalmoes; iqwili	*Alepidea amatymbica; A. delicatula*	Rhizome; Root
13	13	Ysterhoutoppe	*Dodonaea angustifolia*	Leaf & stem
14	13	Roosmary	*Rosmarinus officinalis*	Leaf
15	13	Bitter patat	*Sanseviera aethiopica*	Tuber
16	12	Bloublomsalie; Salie	*Salvia africana-caerulea; Buddleja salviifolia*	Leaf & stem
17	12	Lavender	*Lavandula angustifolia*	Leaf & stem
18	10	Wilde dagga; klipdagga	*Leonotis leonurus*	Leaf & stem
19	10	Soethout wortel; sweet root	*Rafnia amplexicaulis*	Root
20	9	Moer bos	*Aristea africana*	Whole plant
21	8	Renosterbos(sie)	*Elytropappus rhinocerotis; Anthospermum spp.? Aspalathus spp.?*	Leaf & stem
22	8	Wilde als	*Artemisia afra*	Whole
23	8	Mathunga	*Haemanthus albiflos H. sanguineus*	Bulb
24	8	Perdepis	*Hippobromus pauciflorus*	Leaf & stem
25	8	Ag-dae-genees-bos	*Lobostemon fruticosus*	Leaf & stem
26	7	Kruisement	*Mentha longifolia*	Leaf & stem
27	6	Slang blaar	*Acokanthera oppositifolia*	Leaf
28	6	Karmadik	*Cnicus benedictus*	Whole
29	6	Tiemie	*Helychrisum spp.*	Leaf & stem
30	5	Wildewingerd	*Cliffortia odorata*	Leaf
31	5	Kaneelbol; kaneeltjies	*Eriospermum lanceolatum; Pelargonium triste*	Tuber
32	5	Kruidjie-roer-my-nie	*Melianthus major*	Leaf
33	5	Voelent	*Viscum capense*	Stem

Table 3b continued

34	4	Skilpad	*Dioscorea sylvatica*	Tuber
35	4	Red onion	*Drimia spp.*	Bulb
36	4	View; wynruit	*Ruta graveolens*	Leaf & stem
37	4	Groenamara	*Vernonia oligacephala*	Leaf
38	3	Katterkruie	*Stachys aethiopica*	Leaf & stem
39	3	Witstorm; White storm	*Thesium lineatum*	Root
40	3	Love root		Root
41	2	inqwebeba; white onion	*Albuca setosa*	Bulb
42	2	Red storm	*Bulbine alooides*	Tuber
43	2	Wild ginger	*Siphonochilus aethiopicus*	Rhizome

Table 3c: Traditional healers' most used medicinal plants

No.	Fre-quency	Vernacular/common name	Botanical name	Part (s) used
1	37	impepho	*Helichrysum spp.*	Leaf & stem
2	22	Intelezi; ikhala; aloe; impundu	*Aloe ferox; A. perfoliata; A. plicatelis; A. rupestris Haworthia attenuata; Gasteria bicolor; G. croucheri*	Leaf; whole
3	20	African potato; iNongwe; iNkomfe; iLabatheka	*Hypoxis hemerocallidea; H.colchicifolia*	Corm
4	20	chithibunga	*Rhoicissus spp.*	Tuber
5	17	umwelela; Isivimbampunzi; Wild garlic	*Tulbaghia violacea; T. alliacea*	Bulb
6	14	uMaphipha	*Rapanea melanophloes*	Bark
7	13	Iqwili	*Alepidea amatymbica*	Rhizome
8	13	Umhlonyana	*Artemisia afra*	Whole
9	13	Isilawu	*Behnia reticulata*	Root
10	12	uMathunga	*Haemanthus albiflos H. sanguineus*	Bulb
11	10	Buchu	*Agathosma betulina; A.crenulata*	Leaf & stem
12	10	umredeni	*Drimia elata*	Bulb
13	9	umvuthuza	*Knowltonia bracteata*	Whole
14	9	umnonono; umnono	*Strychnos spp.*	Bark
15	8	icimamlilo	*Pentanisia prunelloides*	Root
16	7	umagaqana	*Bowiea volubilis*	Bulb
17	7	uroselina	*Cinnamomum camphora*	Bark; leaf
18	7	umkhwenkwe	*Pittorporum viridiflorum*	Bark
19	7	itshongwe	*Pachycarpus concolor*	Root
20	6	inqwebeba	*Albuca setosa*	Bulb
21	6	velabahleke	*Cyrtanthus mackenii*	Bulb
22	6	umjelo; ujelo	*Rauvolfia caffra*	Bark
23	5	Mayisake	*Cissampelos capensis*	Root
24	5	isikolipati; ufudu	*Dioscorea sylvatica*	Tuber

Table 3c continued

25	5	umthuma	*Solanum spp.*	Fruit; root
26	4	mlahleni	*Curtisia dentata*	Root; bark
27	4	iphuzi	*Gunnera perpensa*	Root
28	4	ixonya	*Kniphofia uvaria*	Root
29	4	umhlabelo	*Nidorella spp.*	Root
30		umquma	*Olea europaea. Subsp. africana*	Leaf
31	4	umafumbuka	*Sarcophyte sanguinea subsp. Sanguinea*	Bulb
32	4	isibharha; isibhaha	*Warburgia salutaris*	Bark
33	4	uvukwabafile		Root; bark
34	3	umkhanya-kude	*Acacia xanthophloea*	Bark
35	3	uvuma		Root
36	3	iMpinda bamshaye	*Rhoicissus tomentosa*	Tuber
37	3	umgxam	*Schotia spp.*	Bark; leaf
38	3	imifingwane	*Stangeria eriopus*	Root
39	3	umkhuhlwa	*Trichilia spp.*	Root; bark
40	3	indonya		Rhizome
41	2	isindiyandiya	*Bersama lucens*	Root
42	2	umahlabekufeni	*Croton gratissimus*	Root; leaf
43	2	Gibeleweni	*Croton sylvaticus*	Root
44	2	ulathile	*Hippobromus pauciflorus*	Leaf & stems
45	2	isithithibala	*Ledebouria spp.*	Bulb
46	2	umnukane; uNukani	*Ocotea bullata*	Bark
47	2	inceba	*Polygala serpentaria*	Root
48	2	umthathi	*Ptaeroxylon obliquum*	Bark
49	2	idolo lenkonyana	*Rumex spp.*	Root
50	2	isiphepheto	*Siphonochilus aethiopicus*	Rhizom
51	2	umkhamamasane	*Tabernaemontana ventricosa*	Root
52	2	umlungumabele	*Zanthoxylum capense?*	Bark
53	2	mlomo-mnandi		Root
54	2	nkuphulane		Root
55	2	ungcana		Root

Table 3d: Comparison of the 10 most traded medicinal plants in the Cape Peninsula, Eastern Cape and KwaZulu-Natal.

No.	Cape Peninsula	Eastern Cape[1]	KwaZulu-Natal[2]
1	*Helichrysum sp*	*Hypoxis hemerocallidea*	*Scilla natalensis*
2	*Agathosma betulina & A .crenulata*	*Ilex mitis*	*Alepidea amatymbica*
3	*Tulbaghia violacea; T. alliacea*	*Rhoicissus digitata*	*Octea bullata*
4	*Hypoxis hemerocallidea; H. colchicifolia*	*Rubia petiolaris*	*Warburgia salutaris*
5	*Aloe spp.*; Gasteria bicolor; G. croucheri; Haworthia attenuata*	*Helichrysum odoratissimum*	*Eucomis autumnalis*
6	*Alepidea amatymbica; A delicatula*	*Curtisia dentata*	*Curtisia dentata*
7	*Cissampelos capensis*	*Protorhus longifolia*	*Haworthia lamifolia*
8	*Sutherlandia frutescens*	*Bulbine latifolia*	*Bowiea volubilis*
9	*Chironia baccifera*	*Haworthia attenuate; Gasteria bicolor*	*Siphonochilus aethiopicus*
10	*Bulbine latifolia*	*Rapanea melanophloes*	*Secamone gerrardii*

Aloe ferox; A .perfoliata ; A. plicatelis; A.rupestris
[1] Dold and Cocks, 2002.
[2] Mander, 1998.

Of the traded medicinal plant parts, 26% comprised roots, 11% bulbs, 10% bark, 9% uprooting of the whole plant and 8% tubers. Aerial parts, which comprise leaves, stems, flower and fruits, accounted for 31% of the total of the material supplied in the market. Of concern is the five percent of species where roots, bark and leaves are removed altogether (Fig. 3a).
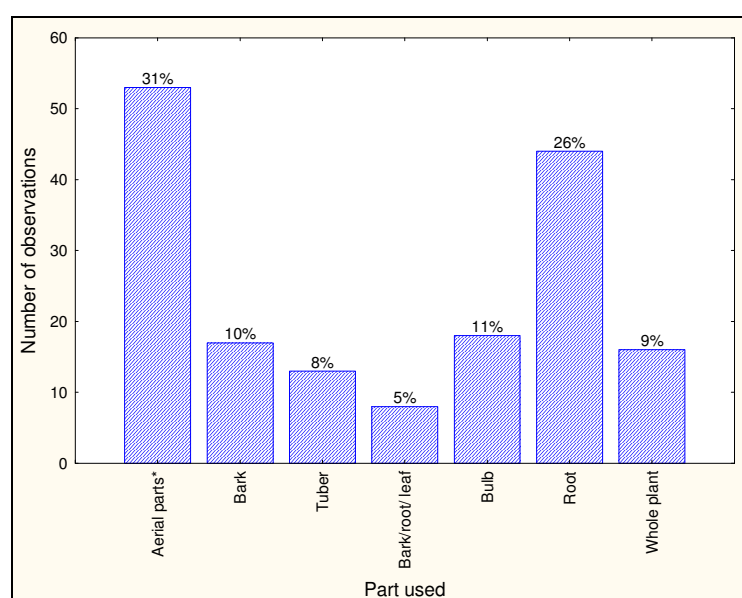
Figure 3a: Overview of plant parts in trade/use

Finally, the survey identified 18 species of plants (Tab. 3e), including those which are vulnerable, rare, critically endangered or those believed to be declining in the wild. Species for which there is insufficient information, but are protected in the Western Cape Province were also included.

Table 3e: Species of concern

Botanical name	Family	Conservation/ Protection status	Sources
Agathosma betulina	Rutaceae	Declining	SANBI, 2007
Agathosma crenulata	Rutaceae	Declining	SANBI, 2007
Alepidea amatymbica	Apiaceae	Data deficient	SANBI, 2007
Bowiea volubilis	Hyacinthaceae	Vulnerable	SANBI, 2007
Cliffortia grandifolia	Rosaceae	Rare	SANBI, 2007
Clivia miniata	Amaryllidaceae	Declining	SANBI, 2007
Clivia nobilis	Amaryllidaceae	Vulnerable	SANBI, 2007
Cyrtanthus mackenii	Amaryllidaceae	Declining	SANBI, 2007
Elaeodendron transvaalense	Celastraceae	Declining	SANBI, 2007
Gasteria bicolor	Asphodelaceae	Rare	SANBI, 2007
Gasteria croucheri	Asphodelaceae	Vulnerable	SANBI, 2007
Haworthia attenuata	Asphodelaceae	Protected	WCPG, 2000
Hypoxis hemerocallidea	Hypoxidaceae	Vulnerable	SANBI, 2007
Illex mitis	Aquifoliaceae	Protected	WCPG, 2000
Kniphofia uvaria	Asphodelaceae	Protected	WCPG, 2000
Ocotea bullata	Lauraceae	Declining	SANBI, 2007
Siphonochilus aethiopicus	Zingiberaceae	Critically endangered	SANBI, 2007
Stangeria eriopus	Stangeriaceae	Endangered	WCPG, 2000

3. 2. 2. Source of traded/used medicinal plants and harvesting frequency

Over 66% of traded/used medicinal plants in the study area are exclusively harvested from the wild populations. Twenty-eight percent of the respondents stated securing their stocks of medicinal plants from various sources, which include home gardens, wild collection and purchase from collectors. Only 6% of the interviewed respondents were exclusively buying their products from harvesters (Fig. 3b).

The bulk of traded/used medicinal plant species in the study area originate from the Western and Eastern provinces. Figure 3c shows that 88% of participants secure their products from the above mentioned provinces. Only 12% of the respondents reported procuring their stocks from KwaZulu-Natal, Lesotho, Northern Cape Province and Swaziland (Fig. 3c).
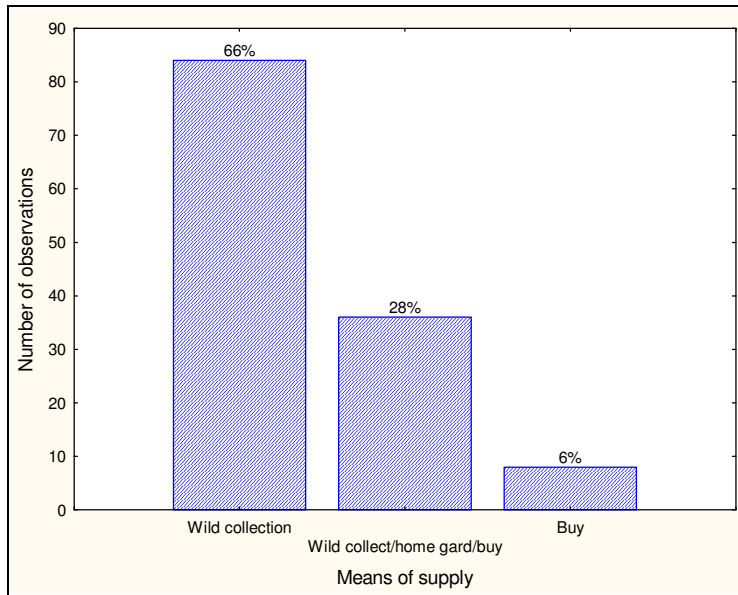
Figure 3b: Means of procurement
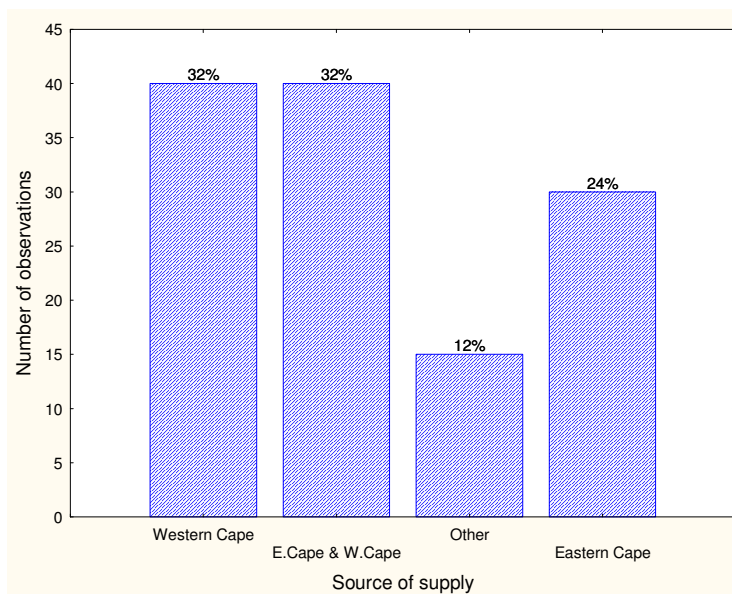
Figure 3c: Sources of plant material

Investigating the seasons in which most harvesting activities take place showed that 41% of the respondents collect their medicinal plants throughout the year, 29% in winter and 27% in summer (Fig. 3e). The majority of the respondents (52%) renewed their stock of medicinal plants every month, 22% every week and 17% once to 6 times per year (Fig. 3d). The 17% of those

who harvest less during the year comprise mostly traditional healers who are largely non-native to the Western Cape Province.
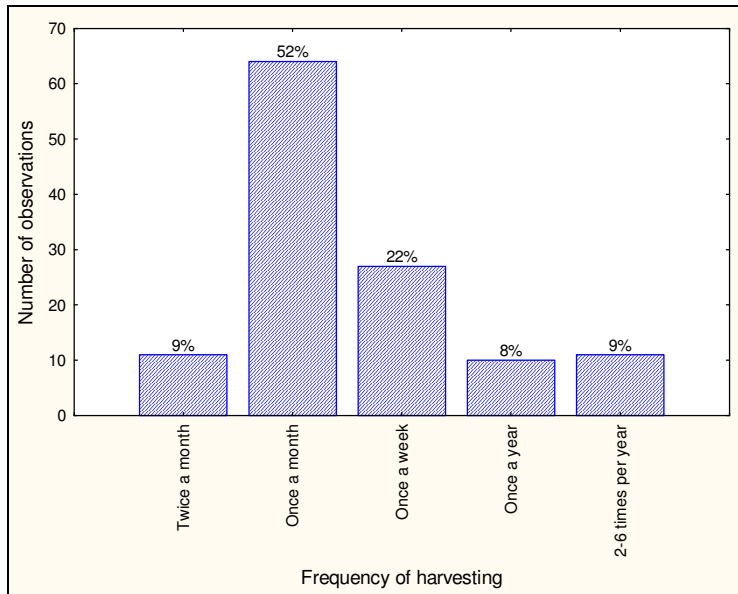
Figure 3d: Frequency of harvesting
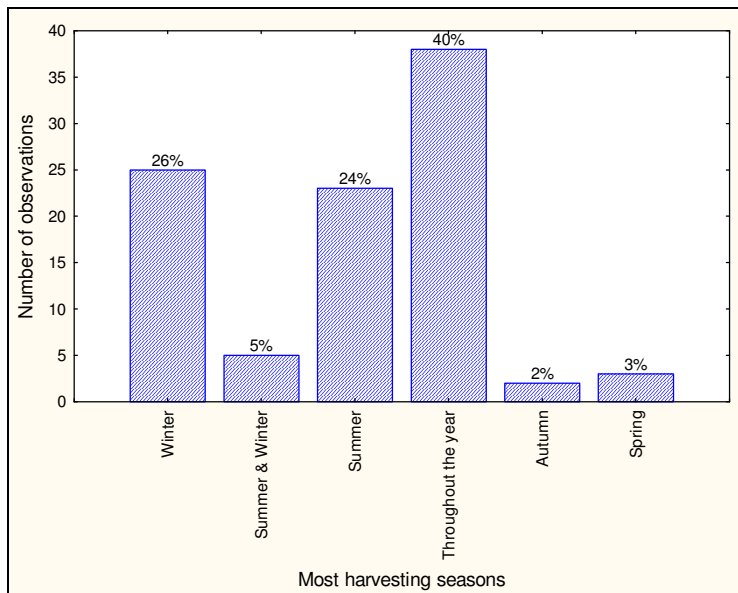
Figure 3e: Harvesting seasons

3. 2. 3. Financial value of some medicinal plant species

The Rhizome of *Bulbine latifolia* was the highest price-fetching medicinal plant species among the Rastafarian traders. Its average price was R12.33±4.17 at the time of the survey. *Haemathus spp.,* (11.57±6.65), *Hypoxis spp.* (R10.12±5.21) and *Alepidea spp.* (R10.00) were the other most valued species among Rastafarian communities. Traders set the price of products according to the size. For example, a small piece of the rhizome of *Bulbine latifolia* was valued at R10.00, while the larger one reached R25.00. Similarly, a small corm of *Alepidea amatymbica* costs R5.00, while a bigger diameter costs R25.00 (Tab. 3f). However, the frequently encountered prices (mode) for these two species were R15.00 and R10.00, respectively. Furthermore, Table 3e shows that species which are sold for their bulbs, corms, rhizomes, roots and tubers are more valued than those sold for their leaves.

It was difficult to assess the value of a single medicinal plant species traded by traditional healers, as most of the products consisted of mixtures from several species. For example, in Khayelitsha, a litre-bottle solution of umgxam bark (*Schotia spp.*) mixed with other species was sold for R50.00 at certain medicinal plant shops. The same price applies to a mixture consisting mainly of umdlavusa (unidentified species). Most importantly, a mixture from the bulbs of umagaqana (*Bowiea volubilis*), believed to bring luck, was sold for R100.00 per litre size bottle.

Table 3f: Average price and price variation of some most traded medicinal plant species

| Plant names | | Part used | Trade unit | Prices in Rand | | | | | | | |
Vernacular	Botanical name			N	Mean	s.d.	Median	Mode	Max	Min	Range
Rooiwortel	*Bulbine latifolia*	Rhizome	Piece	15	12.33	4.17	10	15	25	10	15
Mathunga	*Haemanthus albiflos* *H. sanguineus*	Bulb	Piece	7	11.57	6.65	10	10	25	5	20
African potato	*Hypoxis hemerocallidea*	Corm	Piece	17	10.12	5.21	10	10	25	5	20
Kalmoes	*Alepidea amatymbica; A. delicatula*	Rhizome; Root	Piece	8	10.00	0.00	10	10	10	10	0
David root	*Cissampelos capensis*	Root	Piece	15	9.67	2.97	10	10	15	5	10
Sweet root	*Rafnia amplexicaulis*	Root	Piece	6	9.17	2.04	10	10	10	5	5
Chithibhunga	*Rhoicissus spp.*	Tuber	Piece	7	9.00	1.91	10	10	10	5	5
Bitter patat	*Sanseviera aethiopica*	Tuber	Piece	7	8.57	5.56	5	5	20	5	15
Intelezi	*Aloe ferox; A. perfoliata; A. plicatelis; A. rupestris; Haworthia attenuata; Gasteria bicolor; G. croucheri*	Whole; Leaf	Piece; leaf	12	7.92	3.34	7.5	5	15	5	10
Wild garlic	*Tulbaghia violacea; T. alliacea*	Bulb	Piece	20	7.07	3.72	5	5	15	2	13
Timie	*Helychrisum spp.*	Leaf & stem	Small bunch	4	6.87	2.39	6.25	5	10	5	5
Boegoe; Buchu	*Agathosma betulina; A. crenulata*	Leaf & Stem	Small bunch	31	6.81	3.63	5	5	20	2	18
Cancer bush	*Sutherlandia frutescens*	Leaf & Stem	Small bunch	20	6.62	2.60	5	5	15	5	10
Ysterhouttoppe	*Dodonaea angustifolia*	Leaf & Stem	Small bunch	11	5.68	1.62	5	5	10	5	5
Bitterbos	*Chironia baccifera*	Leaf & Stem	Small bunch	19	5.53	1.97	5	5	10	2	8
Lavender	*Lavandula angustifolia*	Leaf & Stem	Small bunch	9	5.50	2.18	5	5	10	2	8
Bloekom	*Eucalyptus spp.*	Leaf	Small bunch	12	5.37	1.87	5	5	10	2	8
Bergselery	*Peucedanum galbanum*	Leaf & stem	Small bunch	13	5.35	1.80	5	5	10	2	8

Table 3f continued

Vernacular	Botanical name	Part used	Trade unit	N	Mean	s.d.	Median	Mode	Max	Min	Range
imphepho	*Helichrysum petiolare*	Leaf & stem	Small bunch	34	5.32	2.17	5	5	10	2	8
Roosmaryn	*Rosmarinus officinalis*	Leaf	Small bunch	12	5.00	1.86	5	5	10	2	8
Renosterbos	*Elytropappus rhinocerotis; Anthospermum spp.? Aspalathus spp.?*	Leaf & stem	Small bunch	4	5.00	0.00	5	5	5	5	0
Wilde dagga	*Leonotis leonurus*	Leaf & stem	Small bunch	8	5.00	2.33	5	5	10	2	8
Kruisement	*Mentha longifolia*	Leaf & stem	Small bunch	6	4.67	0.82	5	5	5	3	2
Salie	*Salvia africana-caerulea; Buddleja salviifolia*	Leaf & stem	Small bunch	8	4.62	1.06	5	5	5	2	3
Wilde als	*Artemisia afra*	Whole	Small bunch	4	4.5	1.00	5	5	5	3	2
Moer bos	*Aristea africana*	Whole	Small bunch	6	4.33	1.03	5	5	5	3	2

Picture 7: A Rastafarian street trader in Stellenbosch

Picture 8: Medicinal plant barks on shop shelves in Langa

3. 3. Discussion

Many more species of medicinal plants are traded/used in the study area than reported during this survey. However, documenting species in trade/use, traded parts, harvesting frequencies, source of material and financial value of traded species are starting points for effective resource management and conservation (Williams *et al*., 2000). Consequently, this section presents and discusses the observed trends, using available and appropriate literature.

3. 3. 1. Overview of the most traded/used medicinal plants species

The trade of medicinal plants in the Cape Peninsula is not as extensive as in other urban regions of South Africa such as Johannesburg or Durban. This is reflected not only by the low number of medicinal plant species actively traded/used, but also by the number of people involved in the trade. In fact, Williams and others (2000) reported about 511 species of medicinal plants in active trade in Johannesburg and its surroundings. In KwaZulu-Natal, 400 species of medicinal plants were in active trade; between 2,000 and 3,000 people derived income from medicinal plant trade (Mander, 1998). Conversely, fewer people were involved in the trade of medicinal plants in the Cape Peninsula. This is illustrated by the presence of less than 10 traders, at the time of the survey, in the greater Cape Town metropolitan area. Unlike, Johannesburg and Durban, less than 170 medicinal plants were actively traded in the entire study area.

It is argued that the ranking of medicinal plant species in distinct geographical regions is influenced by differences in healing practices between various ethnic groups as well as by the availability of resources in those geographical areas (Dold and Cocks, 2002). This was true when comparing the top ranked species in the Cape Peninsula with those reported in surveys from the Eastern Cape Province and KwaZulu-Natal. For example, *Helichrysum spp.* were the top ranked species in the Cape Peninsula, but fifth in the Eastern Cape Province and not among the top 10 traded species in KwaZulu-Natal (Table 3d). Within ethnic groups, Imphepho (*Helichrysum spp.*) was the top ranked species among traditional healers, while it was second within the members of the Rastafarian community. Buchu (*Agathosma spp.*), which was the top ranked species among Rastafarians, was ranked 10th among traditional healers (Table 3b & 3c). This discrepancy in ranking medicinal plants could therefore be explained by the difference in healing

practices between Rastafarians who were mainly coloured and traditional healers who were all black.

It is believed that medicinal plants that are the most popular and/or brought into the market are often the most effective (physiologically or psychosomatically) herbal remedies (Cunningham, 1993). A closer examination of the traditional therapeutic claim of some species such as Imphepho, Buchu and African potato may help to explain why these plant species are frequently traded/used.

Impepho (*Helichrysum spp.*)

The popularity of Imphepho as a herbal remedy is not only restricted to the study area. In fact, in a survey of urban market in the Eastern Cape Province of South Africa, among the 60 frequently traded medicinal plants, *Helicrysum odoratissimum* was ranked fifth (Dold and Cocks, 2002). In the Witwatersrand area, out of 50 medicinal plant shops surveyed, 70% had *Helichrysum spp.* on shelves and they were ranked second among the most popular and demanded species of medicinal plants (Williams *et al.*, 2000). These species were also among the 20 most used species in the Bredasdorp/Elim region of the Southern Overberg in the Western Cape Province (Thring and Weitz, 2006).

The reported wide range of therapeutic claims in traditional medicine may explain the popularity of these species. Ailments and diseases reported to be treated by these species encompass body odours, sores, colds, headaches, nausea, respiratory infections, chest, heart, kidneys, gonorrhoea, menstrual pain, diarrhoea, eye, flu, arthritis, bladder, flu, cough, rheumatism, fever and sleeplessness complaints. Some magical uses have also been reported. For example, smoke from burned leaves and stems are believed to invoke the goodwill of ancestors and to induce trances, especially among diviners. Love charms for men and preventing bad dreams are other uses of *Helicrysum spp.* (Watt and Breyer-Brandwijk, 1962; Hutchings *et al.*, 1996; Thring and Weitz, 2006).

Apart from the therapeutic claims in traditional medicine, pharmacological research has demonstrated the antifungal, antibacterial, antimicrobial, antimalarial and anticarcinogenic activities of some *Helicrysum spp.* not only in South Africa, but also in other regions of the world (Cosar and Cubukcu, 1990; Meyer and Afoloyan, 1995; Afoloyan and Meyer, 1997;

Mathekga, 2001; Swartz, 2006; Nostero *et al*., 2001; van Vuuren *et al*., 2006; Yagura *et al*., 2008).

Buchu (*Agathosma spp.*)

Restricted to some regions of the Western Cape Province of South Africa, Buch (*Agathosma betulina* and *A. crenulata*) was an important ingredient in San and Khoi-khoi healing culture (Van Wyk and Gericke, 2000). Today, Buchu is still popular in some regions such as the Cape Peninsula where it is ranked second among the 86 most traded/used species of medicinal plants. Furthermore, products derived from these plants (e.g., essential oils) have entered the international market for food and pharmaceuticals. About 80% buchu essential oils are mainly used in food industry and to a lesser extent in the pharmaceutical industry, aromatherapy and perfume industries (Coetzee *et al*., 1999; Viljoen and Moola, 2007; DA, 2007). Despite the fact that the population of this species is declining in the wild (SANBI, 2007), it is estimated that about 400 tons of raw material (wild and cultivated) are harvested annually (Williams, 2005).

The traditional use of Buchu encompasses the treatment of kidney and urinary tract infections, colds, stomach-ache, rheumatism, gout, fever, bladder, cholera and bruises (Watt and Breyer-Brandwijk, 1962; Scott and Springfield, 2004). Furthermore, in-vitro trials have shown some strong anti-inflammatory, anti-oxidant and weak antimicrobial activities of *A. betulina* (Scott and Springfield, 2004; Viljoen and Moola, 2007).

African potato (*Hypoxis spp.*)

The corn of African potato is among the most traded/used medicinal plant material in South Africa as well as in southern African region (Ojewole *et al*., 2006; Drewes and Khan, 2004). For example, in a survey of medicinal plant market places undertaken in Maputo (Mozambique), Krog *et al*. (2006) found that *H. hemerocallidea* was the top traded species among the 48 species of medicinal plants frequently brought into the market. In addition, among the 60 most traded species of medicinal plants in the Eastern Cape Province of South Africa, African potato was the topmost (Dold and Cocks, 2002). Furthermore, the popularity of African potato was confirmed in the current study where this species was ranked fourth among the 86 most traded/used medicinal plants.

Decoctions and infusions of African potato corms are widely used in South African traditional medicine to treat a number of ailments and diseases, including benign prostate hypertrophy, mental disorder (dizziness, epilepsy and childhood convulsions), bladder and urinary tract infections, asthma, testicular tumours, tuberculosis and HIV/AIDS-related diseases (Watt and Breyer-Brandwijk, 1962; Hutchings *et al.*, 1996; Van Wyk and Gericke, 2000; Ojewole and Musabayane, 2006). There is a wide range of *Hypoxis* extracts available in pharmacies, health shops and supermarkets in South Africa. These include Moducare® (immune booster), Hypo-Plus (food supplement, energy booster and immunity modulator), capsules and tablets consisting of the whole *Hypoxis Hemerocallidea* plant (Drewes and Khan, 2004).

Some experimental trials on animals and humans tend to support some traditional uses of *Hypoxis hemerocallidea*. For example, Ojewole (2006) has demonstrated the anti-inflammatory and antidiabetic properties of *Hypoxis hemerocallidea*. Furthermore, experimental studies on animals support the traditional use of *H. hemerocallidea* in the management and control of certain cardiac dysfunctions (Ojewole *et al.*, 2006). However, despite the in-vitro activity of Moducare® in inducing the increase in T cells from human trial experiments (Drewes and Khan, 2004), there is still controversy regarding the use of *Hypoxis* extract as an effective agent for treating HIV/AIDS due to its toxicity (Govender *et al.*, 2006). This view is also supported by Mills *et al.*, (2005) who found that the use of *Sutherlandia frutescens* and *Hypoxis hemerocallidea* with antiretroviral agents may put patients at risk of treatment failure and viral resistance or drug toxicity. Regardless of this controversy and the reported toxicity, the active trade in this species is still occurring in South Africa.

3. 3. 2. Parts traded, harvesting frequencies and seasons

Despite the paucity of experiments evaluating the impact of harvest on non-timber forest products (NTFPs), the impact of harvest is related to the plant part harvested, frequency and intensity of harvesting (Cunningham, 2001; Nakazono *et al.*, 2004; Schippmann *et al.*,2005). If harvesting of leaves, fruits or flowers has less impact on individual plants, harvesting of roots, bulbs, corms, bark or whole plant is more destructive and may lead to species death (Cunningham, 2001; Dzerefos and Witkowski, 2001; Geldenhuys, 2004; Schippmann *et al.*,2005). Frequent removal of the latter parts may result in plant water uptake reduction, plant carbohydrate reserve depletion and nutrient flow disruption or increase the susceptibility to

fungal attacks (Cunningham, 2001; Geldenhuys, 2004; Botha *et al*., 2004). Regrettably, at least 74% of the respondents harvest a minimum of 60% of these vital parts every month (Figure 3a & 3d). Therefore, following Struhsaker (1998), who refers to sustainable harvest as activities involving the removal of a natural resource that do not deplete or compromise its ability to regenerate in the future, medicinal plants traded/used in the Cape Peninsula may not be sustainably harvested (as shown in Picture 8).

The prevailing usage of these vital plant parts is not only restricted to the study area, but common in the southern African region (Cunningham, 1993). In fact, contrary to West African countries where leaves are the common source of medicine, it is reported that bulbs, bark and roots are commonly used/traded in the southern African region. For example, in the Eastern Cape Province of South Africa, of the 60 most traded medicinal plant species, 93% were sold for their bulbs, tubers, roots, bark or the whole plant (Dold and Cocks, 2002). The removal of whole plants, roots, bulbs and bark totalled 83% of all plant material traded in the Witwatersrand area (Johannesburg and its surroundings) (Williams *et al.*, 2000). Moreover, in Maputo, of the reported traded medicinal plant products, 24% consisted of leaves, fruits or branches, while 76% comprised of destructive parts, including roots, bulbs, bark or whole plants (Krog *et al*., 2006). The embedded belief, especially among traditional healers, in low content of active compounds in leaves compared to other parts such as bark fuel the increasing use of these destructive parts (Geldenhuys, 2004). Despite scientific evidences supporting this fact, Geldenhuys (2004) argued that the concentration in active compound from leaves could be increased by merely increasing the quantity of leaves used.

3. 3. 3. Financial value of some traded species

It is well established that price of natural resources brought into the market provides useful insights into the status of the resource in the wild (Cunningham, 2001). In fact, it is speculated that the financial value of a particular product is inversely related to the supply of the concerned product (Dovie, 2003). Cunningham (2001) also noted that an increase in the price of a particular species is believed to be an indication of its scarcity. This might be true for species such as Rooiwortel (*Bulbine latifolia*), which is the top prized medicinal plant species among the members of the Rastafarian community and was reported to have become scarce in the wild (Vermeulen, 2005).

Despite the fact that factors influencing the financial value of species traded were not among the objectives of this study, it is worth noting that the price of a species tends to be influenced by the source region and also by the part traded. For example, medicinal plants traded for their bulbs, roots, corms or rhizomes were more costly than those traded for their leaves (Table 3e). In addition, apart from *Haemanthus spp.*, the other top prized species (mean: R10+) were not sourced from the Cape Peninsula. Respondents reported to have procured Rooiwortel (*Bulbine latifolia*), Africa potato (*Hypoxis hemerocallidea*) and Kalmoes from Knysna and the Eastern Cape Province. This view of the informants is supported by the literature on the distribution of plants in South Africa (Germishuizen and Meyer, 2003; Goldblatt and Manning, 2000).

Besides the area from which plants were sourced, parts of the plant traded and the relative abundance of the species in the wild, the physical effort of acquiring a species may be also a criterion for valuating a particular species on the market. This might be true when considering species such Umathunga (*Haemanthus spp.*) and Rooiwortel (*Bulbine latifolia*), which have been reported to preferentially grow on rocky slopes (Goldblatt and Manning, 2000). Therefore, harvesting such species necessitates physical effort and also time, leading to high prices for the traded parts of the species on the market. Effort of acquiring a species was also mentioned by traders and traditional healers in the areas adjacent to the Kruger National Park as one of the criteria for setting the price of medicinal plant species brought into the market (Botha, 2001).

3. 4. Conclusion

Although the trade of medicinal plants in the Cape Peninsula is not as broad as in other regions of South Africa, the percentage of destructive part in trade, the frequency of harvesting and the presence of some threatened species in the market are matters of concern. Eighty-six species were actively traded and 18 of them, which should be given special attention, were of concern.

Chapter 4: Social, cultural and economic attributes influencing the trade of medicinal plants in the Cape Peninsula

4. 1. Introduction

Medicinal plants have been used as sources of medicine for treating human ailments, worldwide. Today, up to 80% of the population in developing countries still depend on herbal remedies for their primary healthcare needs (WHO, 2006; Botha *et al*., 2003; Afolayan and Adebola, 2004). In South Africa, every year, about 12-15 million people consult traditional health practitioners and use prescribed preparations (Williams, 2002).

Besides being the primary source of medicines, medicinal plants are increasingly being harvested for income generation. Traditional health practitioners, well known for their sustainable harvesting practices, are no longer the sole collectors of medicinal plants. The high rate of urbanisation, resulting in high demand for medicinal plants, combined with the high rate of unemployment, have favoured the involvement of commercial gatherers. Still, the huge demand for medicinal plants in urban centres has motivated traditional health practitioners to move from rural to urban centres, where their activities can be rewarding (Cunningham, 1993). In the KwaZulu-Natal Province alone, Mander (1998) inventoried about 20,000 to 30,000 people deriving incomes from the trade of non timber forest products (NTFPs), including medicinal plants. Black women, the most marginalized group in South Africa, were the most predominant in this trade. Therefore, as pointed out by Gunatilake *et al*. (2007), for an effective resource management, apart from ecological principles, it is equally important to understand social, cultural and economic conditions of resource users.

The main purpose of this chapter is to address the second objective of the study, which intends to profile social, economic and cultural characteristics of the informants that may influence their involvement in medicinal plants-related activities. This main objective was met by addressing the following research questions: (1) Does gender, age and ethnicity of informants influence the trade of medicinal plants in the Cape Peninsula? (2) Do informants' educational levels, area of birth and number of dependents play a role in their involvement in medicinal plants-related activities? (3) What are the respondents' rationales for involvement in medicinal plants-related activities? In addition, sources of medicinal plants supply, frequency of harvesting and income generated from the trade are also considered in addressing this objective.

4. 2. Results

The following section presents the outcomes of the investigation, which include a detailed social, economic and cultural attributes of the respondents, gender, age groups, ethnicity and residence status of stakeholders involved in the trade of medicinal plants in the Cape Peninsula. Income generated from the trade, educational level attained by the respondents and the duration of involvement in medicinal plants-related activities are also described in these following sub-sections. Procedure and Methodology used in gathering and analysing data to adress the above objective of the study are described in Chapter 1, section 1.6.

4. 2. 1. Gender of the respondents

Social, economic and cultural considerations may influence the way communities interact with their natural environment. Table 4a gives a detailed summary of these attributes within the communities surveyed. One hundred and thirty-one informants were interviewed and the survey consisted of 44% (n=58) women and 56% (n=73) men.

Table 4a: Social, economic and cultural attributes of the surveyed respondents (n=131)

Gender	Proportion
Female	44% (n=58)
Male	56% (n=73)
Home languages	
Afrikaans	30% (n=40)
Xhosa	66% (n=86)
Other(Zulu, Sotho)	4% (n=5)
Ethnicity	
African black	70% (n=92)
Coloured	30% (n=39)
Area of birth	
Western Cape	36% (n=47)
Eastern Cape	60% (n=79)
Other (KwaZulu-Natal, Swaziland, Northern Province, Lesotho)	4% (n=5)
Involvement category in the trade of medicinal plants	
Traditional healers	52% (n=68)
collectors/street traders	30% (n=40)
Shop traders	18% (n=23)

Table 4a continued

Employment status (formal sector)	
Employed	17% (n=23)
Unemployed (formal sector)	76% (n=99)
Self-employed	6.2% (n=8)
Pensioner	0.8% (n=1)
Educational levels attained	
No formal education	6% (n=7)
Primary education	28% (n=33)
Secondary education	63% (n=74)
Tertiary education	3% (n=4)
Involvement in medicinal plants	
Full-time	75% (n=98)
Part-time	25% (n=33)
Rationale for involvement in medicinal plants	
Socio-cultural beliefs	82% (n=101)
Economic reasons	6% (n=7)
Socio-cultural and economic reasons	12% (n=15)
Patient/customer origin	
Mostly within the community	45% (n=42)
Within the community, surrounding towns and other provinces	55% (n=52)
Medicinal plants dependency for living	
Yes	81% (n=57)
No	19% (n=13)

It was found that gender influences the position of the informants in the trade of medicinal plants within the Cape Peninsula region, although this is not the case in other parts of South Africa. For example, the majority of women (83%: n=48) were traditional healers, while 51% (n=37) of the male respondents were in the category of collectors/street traders. Consequently, there is a significant difference (p=0.000) between gender and the involvement category in the trade of medicinal plants (Fig. 4a). There is also a significant difference (p<0.01) between the gender of respondents and the number of dependents supported (Fig. 4b). Female respondents support more people ($\overline{X}$ =5 ±1.43) than their male counterparts ($\overline{X}$ =3.36 ±1.86). However, there is no significant difference between gender and the income generated from the trade of medicinal plants. Similarly, there is no significant difference between gender and the dependency on medicinal plant trade for livelihood.
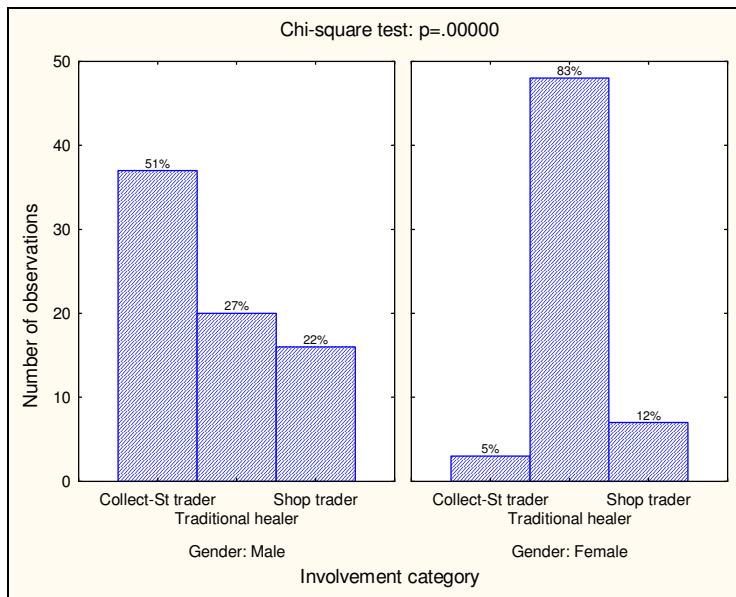
Figure 4a: The effects of gender on involvement category in the trade of medicinal plants
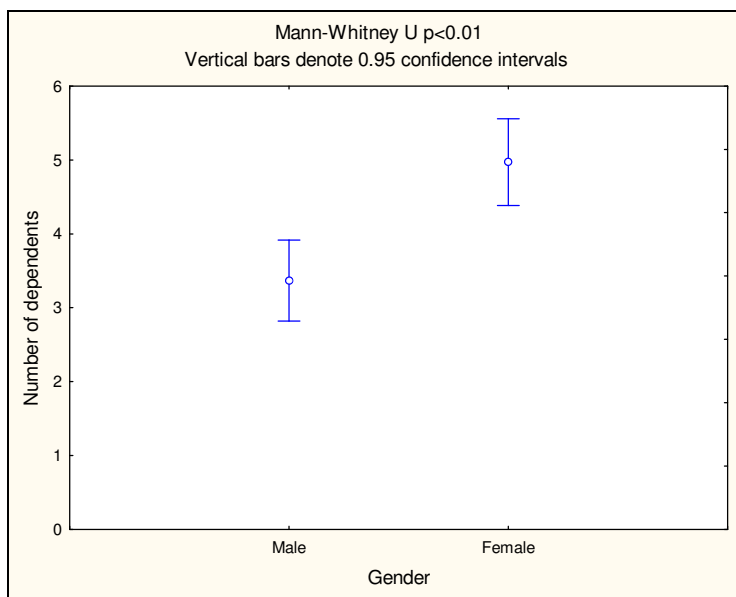
Figure 4b: Gender and the number of dependents supported

4. 2. 2. Age groups of the respondents

When the informants were profiled according to the four age categories, 46% (n=57) of the respondents fall within 41-50 years old, 27% (n=33) within 31-40 years old, 15% (n=19) within 51 years and above and only 12 % (n=14) within 20-30 years old (Tab. 4b). A slightly

significant difference is found (p=0.04) between gender and the age of involvement in the trade of medicinal plants (Fig. 4c). Female respondents become involved in the trade at later stages than male respondents.

Table 4b: Age distribution of the respondents

Age groups	Street trader/ collectors	Shop traders	Traditional healers	Total
Group 1 [20-30]	9	3	2	14 (12%)
Group 2 [31-40]	15	4	14	33 (27%)
Group 3 [41-50]	13	11	33	57 (46%)
Group 4 51+	0	3	16	19 (15%)
Total	37	21	65	123
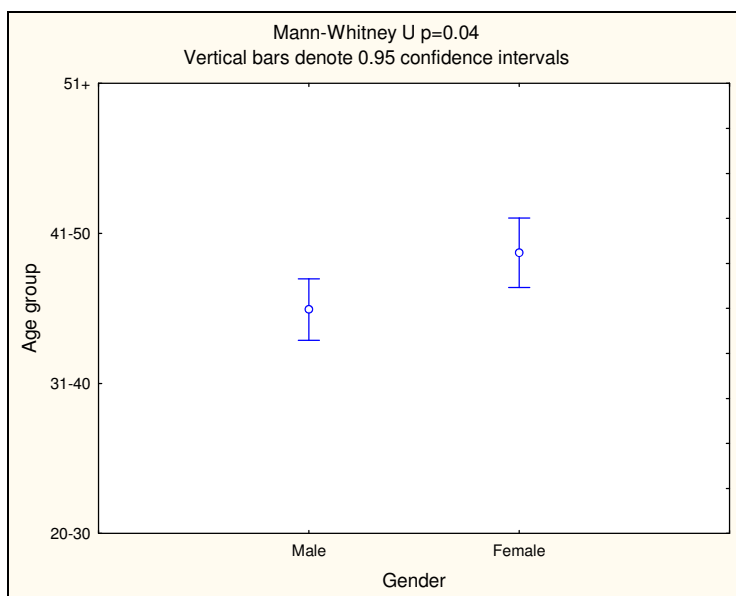
Figure 4c: The effects of age on gender involvement in the trade of medicinal plants

Involvement category is also influenced by the age of respondents. The majority of collectors/street traders (65%: n=24) fall within the 20-40 year category, while 67% (n=14) of shop traders and 75% (n=49) of traditional healers fall within 41 years and above (Tab. 4b). Accordingly, there is a significant difference (p=0.000) between the involvement category in the trade and the age of the respondents (Fig. 4d). Equally, there is a significant difference (p=0.009368) between age and the time of involvement in the trade of medicinal plants. Younger

respondents are partially involved in the trade of medicinal plants as opposed to older respondents who tend to be fully involved (Fig. 4e).
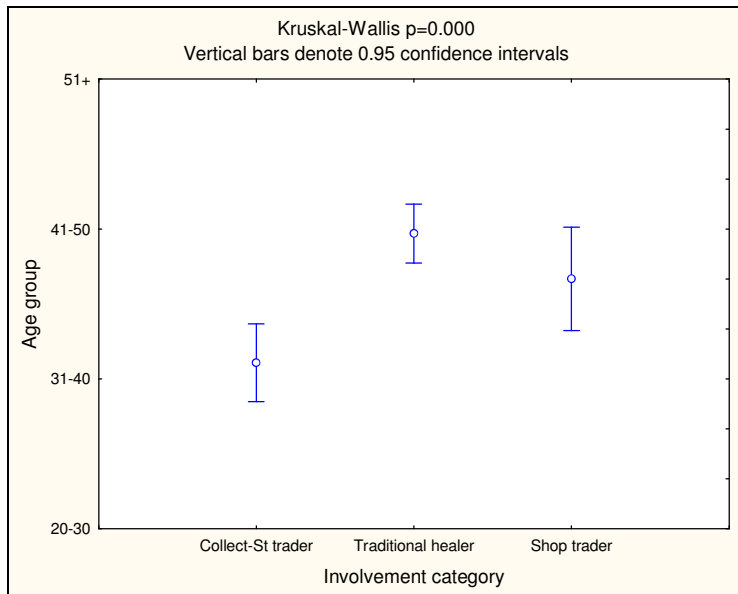
Figure 4d: The effects of age on the involvement category in the trade of medicinal plants
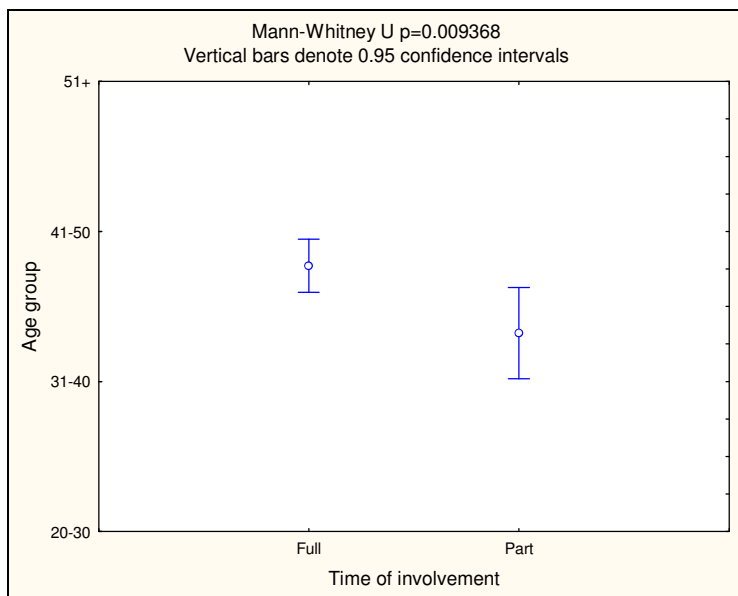
Figure 4e: The effects of age on the time of involvement in medicinal plant trade

In addition, although weak, there is a positive correlation (r=0.23; p=0.02) between the age groups and the number of sources of supply (Fig. 4f). Older respondents seem to have more choice of sources of supply than younger respondents. However, although there is a trend towards the decrease of income with age, no significant correlation exists between income and age groups (Fig. 4g). There is equally no significant difference between the age groups and the motivation for entering the informal trade of medicinal plants.
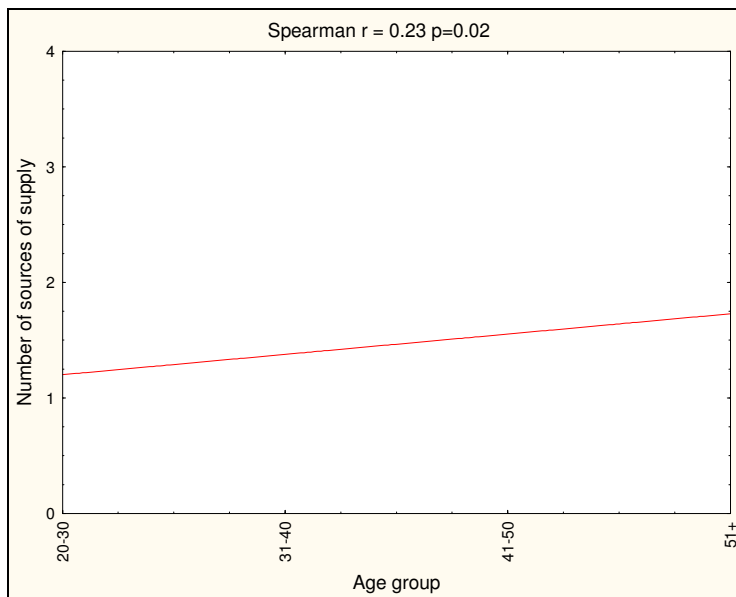
Figure 4f: The effects of age on the number of sources of supply
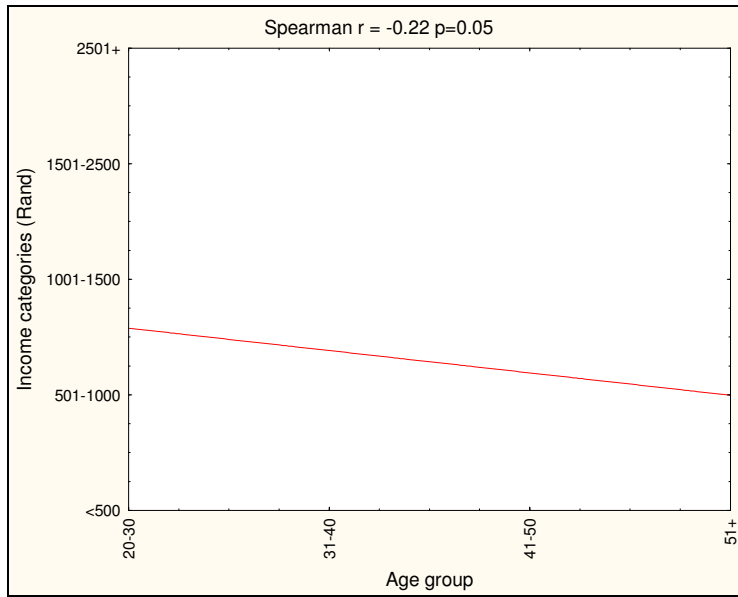
Figure 4g: The effects of age on the income generated from the trade

4. 2. 3. Ethnicity

Seventy percent (n=92) of the informants were black and 30% (n=39) were coloured; there was no white person found in the informal trade of medicinal plants in the Cape Peninsula. Among the black group, 74% (n=68) were traditional healers, 23% (n=21) owned medicinal plant shops and only 3% (n=3) were collectors/street traders. Coloured respondents, who turned out to be all Rastafarians, were predominantly collectors/street traders (95%: n=37) and only 5% (n=2) owned medicinal plant shops.

Grouping informants by ethnicity has revealed some significant differences. For example, a significant difference (p=0.000064) exists between ethnicity and the age of involvement in the trade of medicinal plants (Fig. 4h). Coloured respondents engage in the trade of medicinal plants earlier than black respondents. In fact, not many coloured respondent were found above 51 years of age.
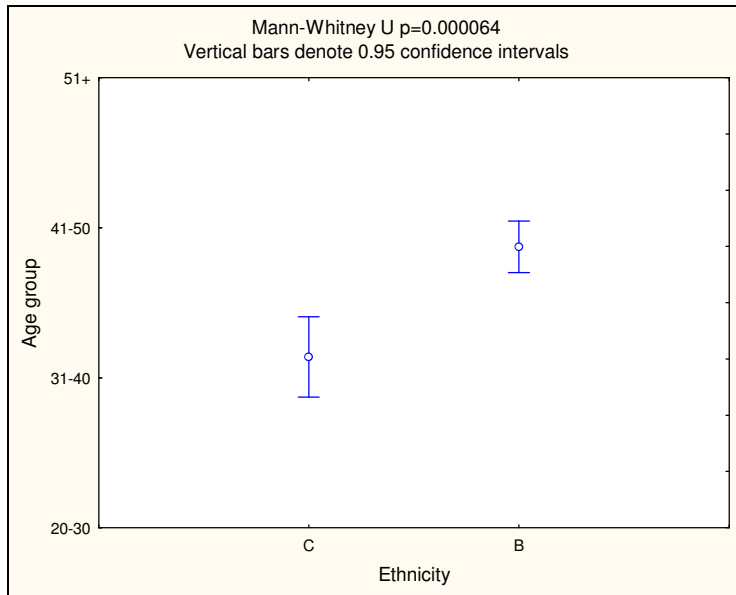
Figure 4h: Ethnicity and the age of involvement in the trade of medicinal plants

The reasons for involvement in medicinal plant trade also differ according to ethnicity. Ninety-two percent of the black respondents considered their involvement as culturally motivated, while only 62% (n=24) of the coloured respondents stated the same motivation for their involvement. Eighteen percent of the coloured respondents (n=7) justified their involvement in the trade of medicinal plants for economic reasons. None of the black respondents mentioned economic considerations per se, as a motivation for their involvement. Consequently, there is a significant difference (p=0.0002) between ethnicity and the reasons for entering into medicinal plant-related activities (Fig. 4i).
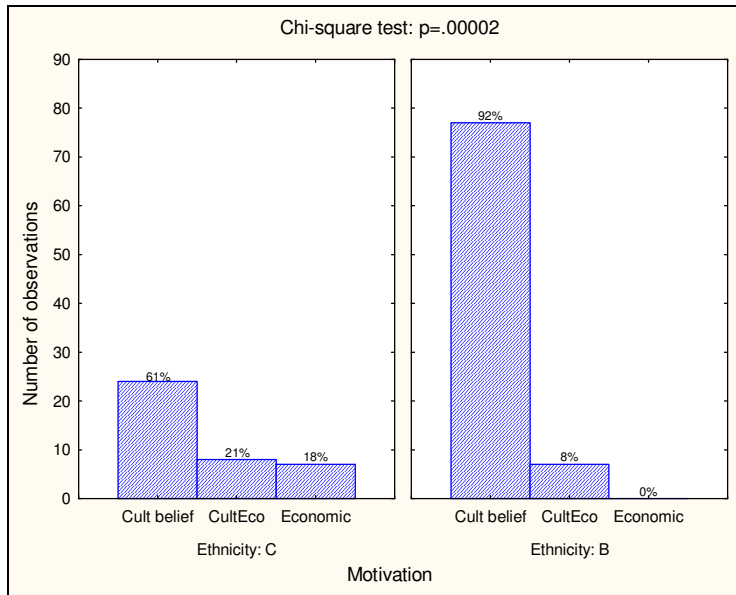
Figure 4i: Effect of ethnicity on the underlying rationale for involvement

There is also a significant difference (p=0.000106) between ethnicity and the number of dependents supported by the medicinal plant trade (Fig. 4j). Black respondents support more dependents ($\overline{X}$ =4.7755±1.5037) than the coloured respondents ($\overline{X}$ =2.875±1.8723).
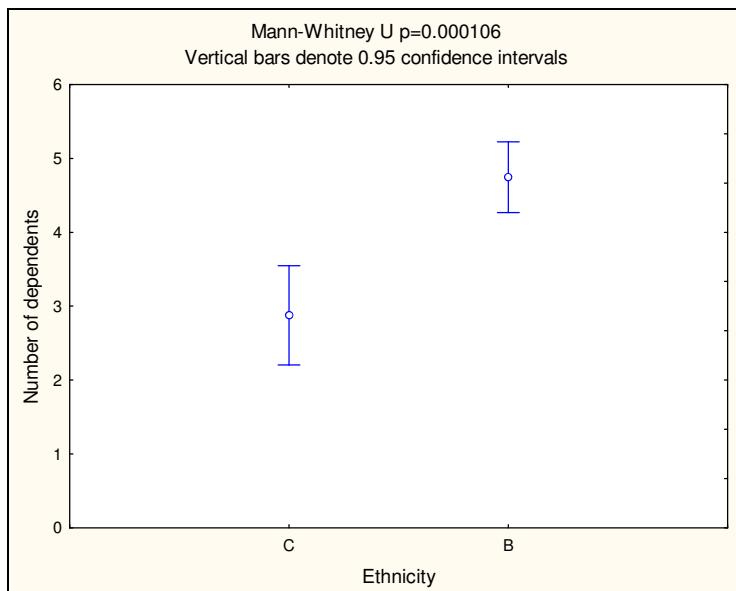
Figure 4j: Number of dependents supported and ethnicity

Furthermore, ethnicity influences the sources of supply as well as the the choice of harvesting season. The majority of the coloured respondents (82%: n=32) exclusively collect their medicinal plants from the Western Cape vegetation, while only 9% (n=8) of the black respondents do so. The majority of the black respondents (40%: n=34) are sourcing their medicinal plants from both the Western and Eastern Cape provinces, while 35% (n=30) of the black respondents collect their medicinal plants from the Eastern Cape Province exclusively. None of the coloured respondents exclusively depend on other provinces to secure their products. As a result, there is a significant difference (p=0.00000) between ethnicity and the sources of supply of medicinal plants (Fig. 4k). Similarly, there is a significant difference (p=0.00000) between ethnicity and the most harvesting seasons (Fig. 4l). Fifty percent (n=19) of the coloured respondents generate more income during winter, while 48% (n=40) of the black informants stated enjoying high sales of medicinal plants throughout the year.
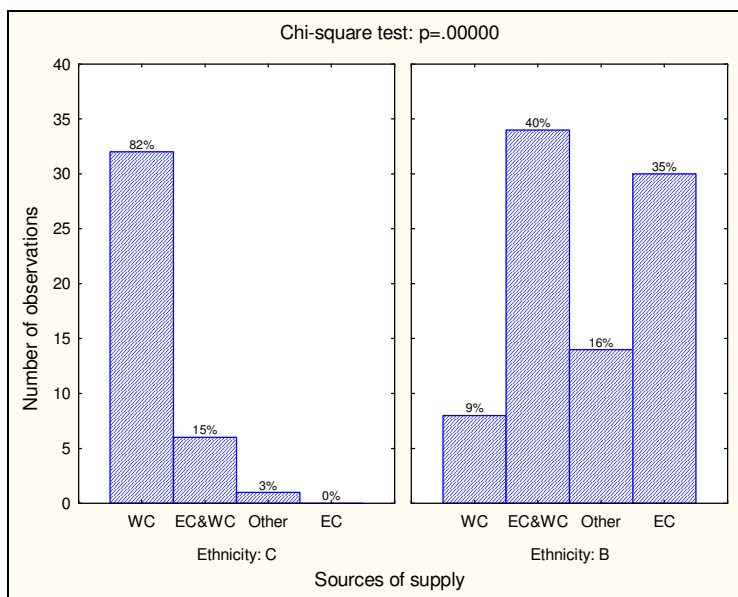
Figure 4k: Effect of ethnicity on sources of supply
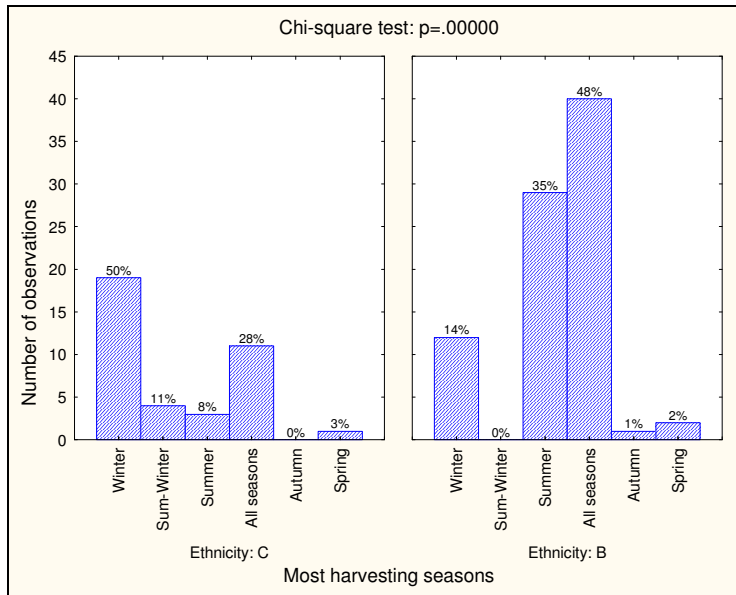
Figure 4l: Ethnicity and the most harvesting seasons

4. 2. 4. Residence status

Thirty-six percent (n=47) of the respondents were born in the Western Cape Province and 64% (n=84) elsewhere. Among the 64%, 94% (n=79) of the respondents came from the neighbouring Eastern Cape Province and the remaining 6% of the respondents came from KwaZulu-Natal, Northern Cape, Swaziland and Lesotho (Tab. 4a above). As with ethnicity, there is a significant difference (p=0.00008) between residence status and the rationale for involvement in medicinal plants (Fig. 4m). Fifteen percent (n=7) of the native informants motivated their involvement in medicinal plants for economic reason. Surprisingly, none of the non-native respondents mentioned economic considerations as the major reasons for their involvement in the informal trade of medicinal plants. Although the majority of the non-native respondents stated cultural motivations for involvement in medicinal plants, 90% (n=37) of them acknowledged the contribution of medicinal plant trade to their livelihood strategies in comparison to the 69% (n=20) of the native respondents. There is a significant difference (p=0.02457) between residence status and medicinal plant trade dependency (Fig. 4n).
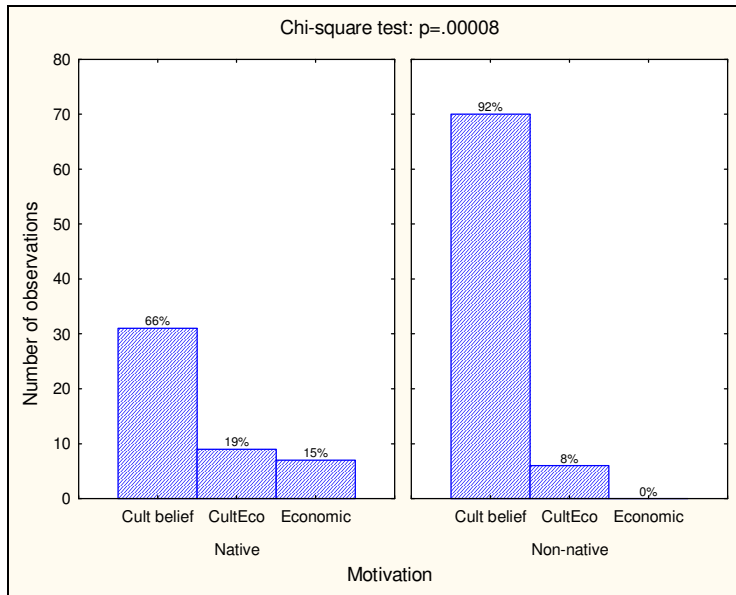
Figure 4m: Effect of residence status on the underlying rationale for involvement
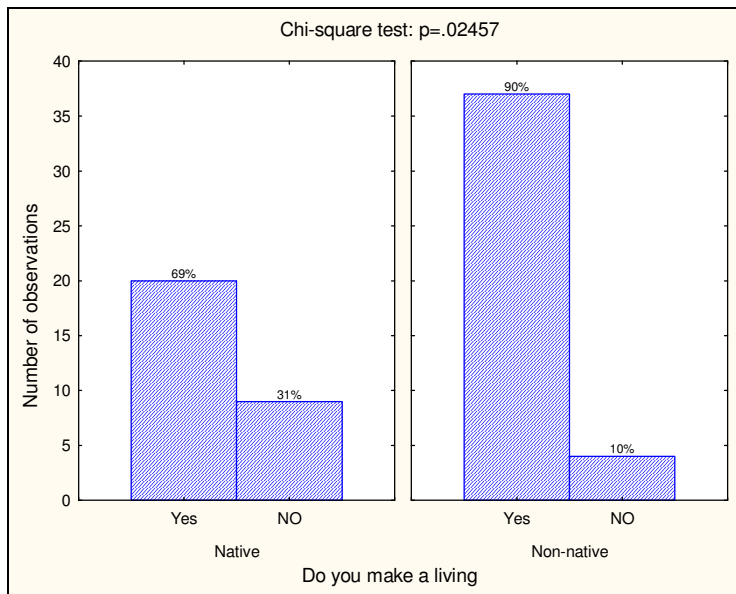
Figure 4n: Effect of residence status on medicinal plant trade dependence

Similarly, there are significant differences between residence status and the number of dependents (p=0.002833) and residence status with sources of supply (p=0.0000) of the traded medicinal plants (Fig. 4o & 4p). Non-native respondents have more dependents to take care of ($\overline{X}$ =4.7381±1.5627) than the native respondents ($\overline{X}$ =3.3548±1.9416). Seventy percent (n=35)

of the native respondents exclusively source their medicinal plants from the Western Cape vegetation, while only 6% (n=5) of the non-natives exclusively depend on the Western Cape to satisfy their demand for medicinal plants.
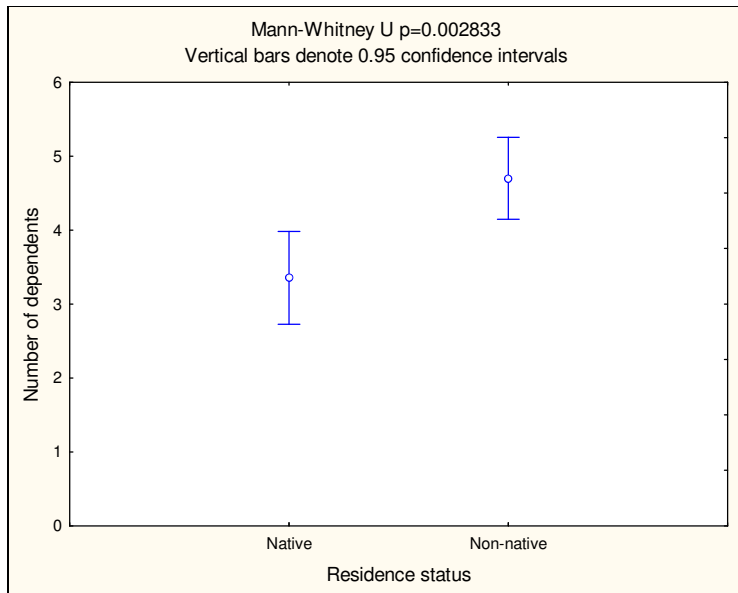
Figure 4o: Number of dependents supported and residence status
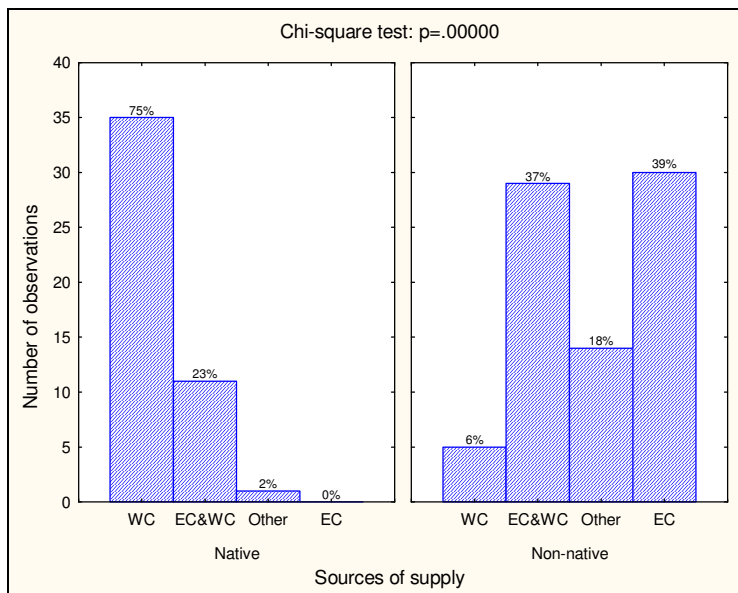
Figure 4p: Effect of residence status on medicinal plant sources of supply

There is also a significant difference (p=0.002792) between residence status and the number of sources of supply (Fig. 4q). Non-native respondents have more choices ($\overline{X}$ =1.6622±0.8645) than native respondents ($\overline{X}$ =1.1538±0.4315).
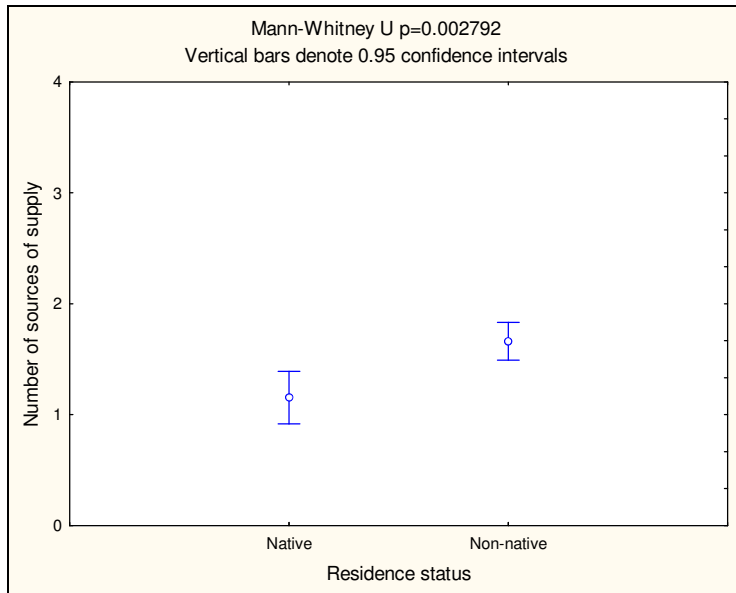
Figure 4q: Effect of residence status on the number of medicinal plant sources of supply

Finally, there is a significant difference (p=0.000018) between residence status and the frequency of harvesting medicinal plants (Fig. 4r). Native respondents harvest more frequently ($\overline{X}$ =29.1395±18.6316) than non-native respondents ($\overline{X}$ =15.3846±5.4879).
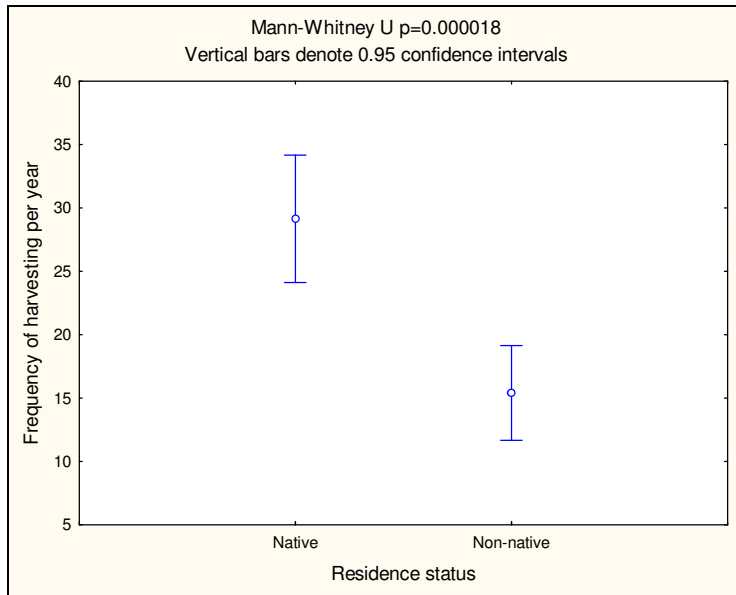
Figure 4r: Effect of residence status on the harvesting frequency

4. 2. 5. Income, educational levels and duration of involvement in medicinal plants

Few of the respondents who are involved in the informal trade of medicinal plants in the Cape Peninsula are uneducated. For example, only 6% (n=7) did not receive any formal education. The majority of the respondents (63%: n=74) acquired some high school education, 28% (n=33) attended primary school and only 3% (n=4) attended or are still busy with tertiary education (Fig. 4s).

In terms of the income generated from the sale of medicinal plants, 37% (n=29) of the respondents earn less than R500 monthly, 35% (n=28) earn between R501 and R1,000 and only 15% (n=12) generate more than R2,501 per month from the trade of medicinal plants (Fig. 4t).
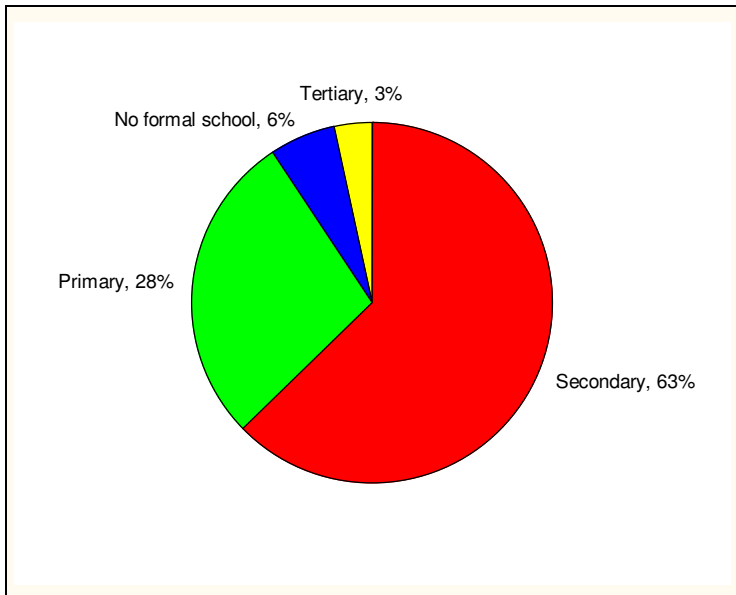
Figure 4s: Educational levels attained by the respondents
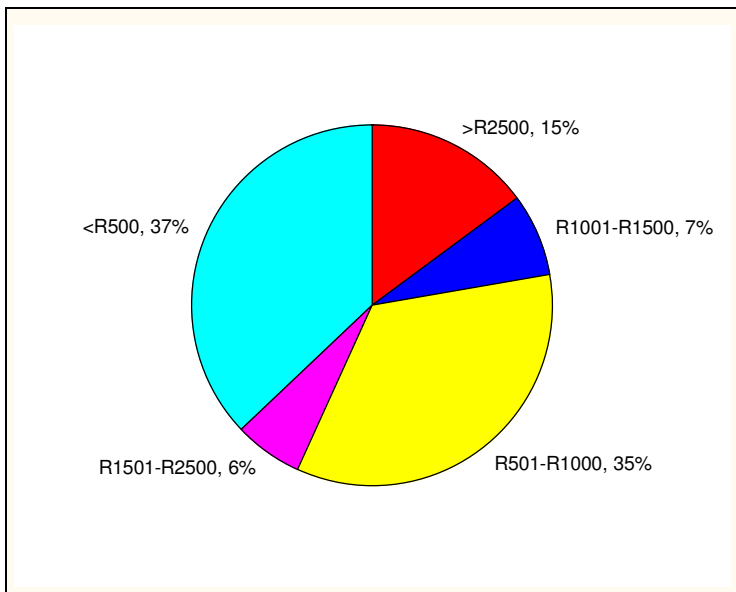
Figure 4t: Income generated from the trade of medicinal plants

Eighty percent (n=97) of the respondents have been involved in medicinal plants for less than six years, 11% (n=13) have been involved for 6-10 years and only 3% (n=4) have more than 20 years of involvement (Fig. 4u). There are no significant differences between gender, ethnicity,

educational levels, time of involvement, residence status and the income generated from the trade of medicinal plants. There are also no correlations between age groups, duration of involvement in medicinal plants and the income generated. However, there is a significant difference between the income generated through the trade of medicinal plants and the position occupied in the trade (Fig. 4v). Shop traders earn more income than collectors/street traders and traditional healers.
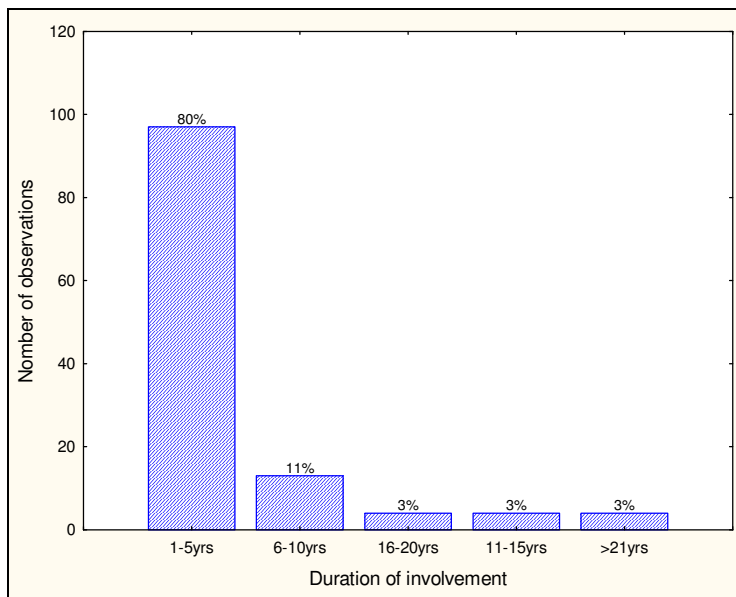
Figure 4u: Duration of involvement in medicinal plants
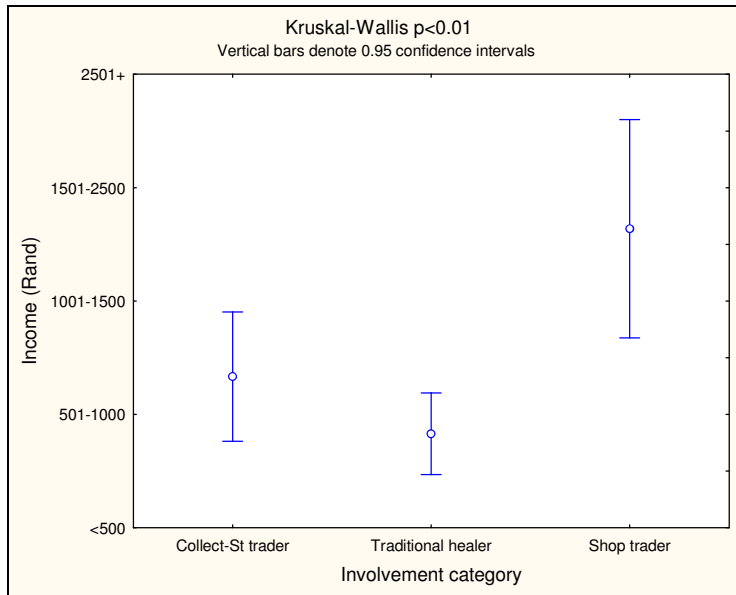
Figure 4v: Effects of trade involvement category on the income generated

4. 3. Discussion

It is well established, in literature, that traditional health practitioners and medicinal plants are an important part of cultures and traditions of indigenous people throughout the world and Africa in particular (Cunningham, 1993; Fennell *et al*., 2004; Kamatenesi-Mugisha *et al*., 2007). From prehistoric times to present day, medicinal plants have been an important source of healthcare; traditional practitioners play significant roles in providing this healthcare in Africa (Watt and Breyer-Brandwijk, 1932; Schuster Campbell, 1998). Despite their critical role in rural areas, traditional health practitioners are also increasingly providing primary healthcare and generating income in urban areas. This is true in the urban areas of the Cape Peninsula where many traditional health providers and medicinal plant traders are practising.

4. 3. 1. Cultural and socio-economic considerations as driving factors for the use/trade of medicinal plants

Several reasons explain the involvement of stakeholders in the trade/use of medicinal plants in the Cape Peninsula. Cultural motivations are among the reasons for involvement. In fact, 82% of the respondents (Table 4a) justified their involvement in the trade or use of medicinal plants for cultural reasons, especially provision of healthcare to people by using natural remedy. The majority of traditional healers interviewed justified their involvement as a

calling from the ancestors. Others reported receiving this call from ancestors after a long period of sickness. They believe that medicinal plants will play an important role in African people's lives. This is supported by Schuster Campbell (1998: 4) who, after investigating traditional healing in southern Africa, stated that "traditional healing is a deep-rooted part of African life and, traditional healers believe, will continue as African culture survives". Aside from traditional healers, Rastafarians are also actively involved in the use and trade of medicinal plants. The use of natural food (ital) and herbal remedies is part of their culture. This self-reliance is believed to prevent them from consumerism and other modern practices. Unlike the traditional healers, who became involved through "spiritual calling", the Rastafarian knowledge of medicinal plants has been handed down orally from father to son or among members of their communities. The influence of cultural factors in the use of plants as medicines had already been documented in other parts of the world. For example, in Navarra, Akerreta *et al.* (2007) reported the influence of cultural factors over ecological factors (geographic distribution) in selecting plants for medicinal use. In surveys conducted by Pieroni (2001) and da Rocha Silva and de Holanda Cavalcante Andrade (2006), informants exhibited special preference towards plants culturally believed to possess health properties among other wild food plants.

The importance of biodiversity in sustaining livelihood and alleviating poverty in rural areas is widely recognized (Koziell, 2000; Shackleton and Shackleton, 2004; Shackleton *et al.*, 2007). However, the use of natural resources for subsistence and income generation is not restricted to rural communities. Non-timber forest products (NTFPs) are increasingly being used and traded in urban areas for income generation. This is true for medicinal plant trade in urban centres such as Durban (Mander, 1998), Port Elizabeth (Dold and Cocks, 2002), Johannesburg (Williams *et al.*, 2000) and in urban areas of the the Cape Peninsula as shown by the present study.

Unemployment and poverty are among the driving factors for informal trade of medicinal plants. Indeed, despite the low unemployment level in the Western Cape (18.6% in 2004; 26.2% nationally) (Stats SA, 2006), 18% of the Rastafarian respondents (Figure 4m) justified their involvement in medicinal plants trade for economic considerations and 76% of the surveyed informants were among the unemployed in the formal sector. Seventy-five percent of the respondents are fully involved in the trade or activities related to medicinal plants. Eighty-one percent of the informants, including those motivated by cultural considerations, have

acknowledged making a living through the sale of medicinal plants or medicinal plant-related services (Table 4a). In Fisante Kraal, a pensioner who is a traditional healer mentioned the insufficiency of his pension grant to meet his family living costs. He reported using his pension grant just to cover the transport cost of his medicinal plants from Transkei (former homeland) to his location and that the bulk of his revenue is derived from fees paid by patients. In Paarl, a male Rastafarian collector/street trader reported the trade of medicinal plants as his unique option for feeding his family. He mentioned that he was arrested several times in the past by conservation agencies and private landowners for illegal harvesting, but reaffirmed carrying on with that activity as it was the only source of income generation. This denotes the fact that, despite the risks that they may face, people whose subsistence depends on harvesting and trading products from the natural environment would continue to do so in the absence of job opportunities regardless of any associated risks. A similar case has been documented by Williams (2002) in a survey of medicinal plant trade in Faraday Market in Johannesburg. A widow street trader, who had been arrested several times for collecting cycads, reported to continue to do so because her family was more important than the intrinsic value of an ancient gymnosperm (cycads).

It could also be argued that the trade of medicinal plants is a lucrative activity, which provides considerable returns to an extent that people involved would not seek other job opportunities in the formal sector. The earnings of some informants from the trade of medicinal plants are much higher than they would have had in working in any the formal sector. For example, a shop owner, in Khayelitsha, has acknowledged making a lot of money from the trade of medicinal plants and was not interested in seeking for other jobs in the formal sector.

Furthermore, households with more dependents and fewer options for realizing sustainable livelihoods may rely on natural resources for subsistence and income generation. This is validated by Gunatilake et al. (2007) who found that families with more members harvested more non-timber forest products to generate extra income necessary to support extra subsistence requirements in a rural area. Similarly, Lacuna-Richman (2003) found that households with less income, more dependent members and less to spend on food have greater incentive to augment their income and food supply with non-wood forest products. In this study, the average number of dependents by respondents was 4.150685±1.853459. In the absence of any employment opportunities (in the formal sector), as it stands for the majority of the

respondents (76%), the trade of non-timber forest products in general and medicinal plants in particular may always be an option for income generation. Hence, it is important not to underestimate the role that the trade of medicinal plants can play in easing poverty and in providing extra income in meeting additional household needs.

4. 3. 2. Influence of Gender on the trade of medicinal plants

The limited access of women to employment opportunities, particularly in the formal market, is reflected in the gap between men's and women's unemployment rates (ILO, 2000). Worldwide, the unemployment rates of women are higher than those of men. In Africa, for example, the rate of unemployment for women is double than that of men and this has been increasing. About 24.1 % of women compared to 11.7% of men were unemployed in urban Kenya in 1991. For the same year, the rate of women's unemployment was 9.3% as compared to 8% of men in South Africa (ILO, 2000). In South Africa, the high rate of unemployment for women was partially due to the decline in employment in the agricultural sector since 1970 and stagnation in employment in manufacturing industry where women were the dominant workers (Mohr, 1998; Aliber, 2003). Despite not being the first provider of employment in the Western Cape Province, in 2002, the number of casual and seasonal women workers was higher than full-time employees in the agricultural sector. There were 63,472 full-time male workers for 28,894 women and 58,394 casual and seasonal male workers for 66,574 women (Stats SA, 2006). These limited employment opportunities in the formal sector, combined with low levels of return may have pushed women to engage in self-employment such as subsistence agriculture, small artisanal work and the urban informal trade of medicinal plant.

According to Debroux (2002), worldwide, the most part of informal workers are women. This trend is also noticeable in South Africa. The Labour Force Survey of September 2004 shows that the number of women involved in informal sector was higher than that of men (Stats SA, 2006). However, in the Western Cape, the converse appears to be the case: the percentage of men involved in the informal sector was more than double that of women. Although not to the same extent, men (56%) dominate the informal trade of medicinal plants in the Cape Peninsula. The striking point is that almost all the respondents in the categories of collectors/street traders were men (Figure 4j). This could be explained by the fact that collection of medicinal plants in the Cape Peninsula may be a risky task for women. In fact, most of the plants are found in the

mountains, which necessitate physical efforts. In addition, some of the plants used are grown on private fenced lands, which increase the likelihood of being caught by landowners. In Mpumalanga and the Limpopo provinces, Botha (2001) reported the prevalence of men in the trade of medicinal plants. On the contrary, in KwaZulu-Natal, Johannesburg and other parts of Africa, women dominate as gatherers and suppliers of urban markets (Cunningham, 1993; Mander, 1998).

In addition, the outcomes of this study show a relationship between gender and the number of dependents. Female respondents have more dependents to take care of than males (Figure 4b). Despite the fact that this was not an option in the questionnaire, some women reported being the head of their household. Thus, in the absence of formal job opportunities, these responsibilities could justify their engagement in the informal trade of medicinal plants to satisfy their household needs. Indeed, the general household survey of July 2004 found that of the 139,683 households living in the informal dwellings in the Western Cape, 104,385 were headed by males and 34,845 by females (Stat SA, 2006). Furthermore, according to ILO (2000), the implication of women in self-informal activities is also motivated by the loss or the reduction of income earned by their partners in the formal sectors. This might be the case for some of the female informants in this study.

Finally, male informants are significantly younger than females (Figure 4c). Although the difference is not statistically significant, the number of years of selling or dealing with medicinal plants is higher for women than men. This suggests that men start earlier and they do not stay long (except for traditional healers) in the trade, while women start late and stay longer. In a study on gender analysis of forest products market in Cameroon, Ruiz Perez *et al.* (2003) found the same pattern. They attributed this late involvement of women to the heavy demands of childbearing and the earlier involvement of men to effects of economic crisis and subsequent loss of unemployment.

4. 3. 3. Influence of age and income

Various age groups are represented in the trade of medicinal plants in the Cape Peninsula. The majority of people (75%) fall in the category 20-50 years old, which represents the economically active population (Table 4b & Figure 4d). However, the lack of job opportunities in the formal sector, especially for young who constitute 12% of the sample, makes the trade of

medicinal plants an important income generating activity. An interesting observation from this study is that the position occupied in the trade of medicinal is age-dependent. For example, none of those above 51 years old was found among gatherers/street sellers. In the same way, only two informants within 20-30 years old were traditional healers; the rest of this group consisted of people above 30 years old. The absence of older people as collectors/street traders could be explained by the fact that collecting wild plants is a labour-intensive activity that requires physical strength and good health, conditions which the older people may not fulfil. This is true for people sourcing their stock of medicinal plants from the Cape Peninsula vegetation. During the fieldwork made for the collection of samples, it was found that most of the traded species were collected from mountainous areas. The physical strength requirement was also true for *Prunus Africana* bark harvesters in Cameroon (Cunningham and Mbenkum, 1993). In, fact they reported that activity, requiring hard work, was suitable for young people and no women were involved.

In terms of income, only 35% of the informants earn R500 or less per month, compared to the 57% of traders at the Faraday Medicinal Plant Market who earned R100 or less per week (about R400 per month) (Williams, 2002). Although there was no significant correlation between the income generated from the trade of medicinal plants and the age, there is at least a trend in the income decreases with increasing age (Figure 4g).This outcome is converse to that found by Nkuna (2004) on woodcraft traders in the Hazyview area. Innovation in products, skills and experience were the explanations to that income disparity among informants of different age groups. In the present study, the declining trend in income for old respondents may be due to the decrease in harvesting frequency caused by aging. However, older informants are more fully involved (Figure 4e) and 3% have more than 21 years of involvement (Figure 4u). They tend to know more harvesting places as opposed to younger respondents (Figure 4e & 4f). This does not necessarily imply that older respondents, fully involved, know more medicinal plants than younger people who are partly involved, as this was not an option in the questionnaire. However, in rural Dominica, Quinlan and Quinlan (2007) found that the number of medicinal plants listed by informants increased with age. Apart from the age, 3% of the respondents (Figure 4u) have more than 21 years of involvement, which can help in providing useful insights into species scarcity as well as geographical distribution, hence enhance the sustainable utilisation of traded species.

Notwithstanding, the income generated from the trade varies with the position of the informant in the medicinal plant trade. Shop traders enjoy most of the trade in medicinal plants, with traditional healers lying at the bottom (Figure 4v). The average monthly shop traders' income is between R1,001 and R2,500, which is above the average income of certain people working in the public sector. Conversely, the majority of traditional healers and the majority of all respondents earn less than R1,001. This difference in income may be partially explained by the size of the business and the location of the activity. Most of the medicinal plant shops surveyed are located in densely populated areas such as Khayelitsha. Shops were close to the main roads and the number of species traded was higher than those found in traditional healers' premises. In addition, some products sold in those shops were packaged, adding some value. Street traders' travel between towns to sell their goods and as a result they are present in strategic places such as train and bus stations. In Kraaifontein, a female street trader, working in conjunction with her partner, mentioned travelling to other provinces to sell her semi-processed and raw material. On the contrary, most traditional healers practise in fixed premises; their main purpose is to provide health and money comes naturally in the process of meeting this healthcare need. In Grabouw, for example, some traditional healers reported treating patients in exchange for some other goods. Others mentioned treating patients first and collecting fees later according to the ability of patients to pay. This may explain their position at the bottom of earning.

4. 3. 4. Influence of ethnicity and area of birth on the trade of medicinal plants

The informal trade of medicinal plants in the Cape Peninsula is primarily a domain of black and coloured communities. Coloured respondents, who are all Rastafarians, are involved in the use and trade of medicinal plants at earlier stages than the black Africans surveyed in this study (Figure 4h). This precocious involvement may be explained by their status as natives of the Western Cape Province, which may confer upon them the knowledge of useful plants in their environment. In addition, living in harmony with nature is one of the central ideas of Rastafarianism. An important aspect of Rastafarian lifestyle is the natural diet which they adhere to. The diet of the Rastafarians consists of organic and vegetarian foods. Herbal medicines are widely used within Rastafarian communities. The general belief among Rastafarians is that there is no illness for which nature provides no cure. Wild bushes and leaves from trees are prepared in teas and juices, which are aimed at the alleviation of certain symptoms, including headaches,

colds and others. This environmentally sound lifestyle, that others around the world are only now beginning to strive for, complies with those that are currently prescribed by ecologists and environmentalists.

Rastafarians are also marginalised in the formal sector as they are often discriminated against as growers and smokers of marijuana; others consider them as violent people. This inappropriate label often causes hardships for Rastafarians in finding jobs in the formal sector, thereby encouraging informal sectors such as the trade of medicinal plants. This difficulty was mentioned by many Rastafarian respondents. Kitzinger (1966) had also noticed these difficulties that Rastafarians encounter in finding jobs in Jamaica. Recognizing the high rate of unemployment, she noticed that Rastafarians tended to be the last to be employed and the first to be fired. Therefore, this value placed on natural world, combined with their marginalisation in the formal sector may lead to their earlier involvement in medicinal plant usage and trade.

These data have also revealed that ethnicity and birth status influence the source of traded medicinal plants (Figure 4k & 4p). Eighty-two percent of the coloured respondents exclusively source their medicinal plants from the Western Cape vegetation, while only 9% of the black respondents do so. Thirty-five percent of the black respondents exclusively harvest their medicinal plants in the Eastern Cape Province. Furthermore, 40% of the black respondents secure their medicinal plants stock from both the Western Cape Province and from the neighbouring Eastern Cape Province. In Tsitsikamma, Faasen and Watts (2007) found that more native members of the communities, without any alternative livelihoods, were more opposed to the policy of "no take" fishing introduced by the SANParks than the non-natives. This supports the general perception that economically vulnerable members of communities depend more on local natural resources and highlights the fact that they are the most affected when the resource is depleted or banned from harvesting.

Furthermore, the native respondents' dependency on local environmental assets is further stressed by their high frequency of harvesting compared to the non-native respondents (Figure 4r). However, this low frequency of harvesting by the non-native respondents does not necessarily imply that they are experiencing a shortage of the stock, but emphasizes their diversity of sources of supply. Data from this study show that non-native respondents have an average number of supply sources of 1.6622±0.8645 compared to 1.1538±0.4315 for native respondents (Figure 4q). This low frequency of harvesting by non-natives may also denote the

fact that when they harvest, big quantities of plant materials are extracted (Chapter 3; Photo 8). It has been noted that few native respondents could afford to procure their stock from other provinces. This shows the difference in financial power among the members of the same community and in line with the findings of Cardenas *et al*. (2002). They realised that the richer members of a community, those with more valuable alternatives, put less pressure on the local environment than their less-advantaged neighbours. KwaZulu-Natal, Gauteng Province, Northern Cape, Swaziland and Lesotho, are other source regions of medicinal plants used and traded in the Cape Peninsula.

The majority (48%) of the black respondents enjoy the trade of medicinal plants throughout the year, while only 28% of the coloured respondents do so. The majority (50%) of the coloured respondents have better returns from the trade of medicinal plants in winter (Figure 4l). According to their explanations, this trend is driven by the upsurge of certain ailment such as cold and flu due to the change in season and the availability of certain used species (annuals) during the winter period.

Furthermore, the data from this investigation show relationships between ethnicity, areas of birth, and the number of dependents. Non-native black respondents have more members to take care of ($\overline{X}$ =4.7755±1.5037) than the native coloured respondents ($\overline{X}$ =2.875±1.853459) (Figure 4j & 4o). In Khayelitsha, a female shop trader reported supporting her family back home in Transkei from the trade of medicinal plants on the Cape Flats. Williams (2002) reported a similar case at the Faraday Medicinal Plants Market in Johannesburg. A 40-50-year woman reported supporting her husband and three children back home in KwaZulu-Natal from the income generated from the sale of medicinal plants. In addition, it has been documented that about 70% of South Africans live in rural areas and 26% of their incomes come from remittances from urban centres. In the former homelands, where the majority of interviewed traditional healers came from, the average household size and monthly income were 7 persons and R650, respectively (South African Government, 2000). The need to provide for a larger number of dependents and high levels of poverty in rural areas appear to be the primary factor causing rural to urban migration in the Cape Peninsula area.

4. 4. Conclusion

Although the majority of the people involved in the trade of medicinal plants in the Cape Peninsula are culturally motivated, a considerable proportion of them acknowledged making a living from the sale of natural resources. Unemployment and the need to provide for a large number of dependents seem to be the driving factors for this trade. Ethnicity and residence status influence the source of plants used in the trade. Incomes generated are related to the involvement category in the trade, which in turn, may be influenced by the age of stakeholders.

Chapter 5: Constraints and opportunities for conserving medicinal plants in the Cape Peninsula

5. 1. Introduction

Today, most of South Africa's urban and rural communities rely on medicinal plants for their primary healthcare needs and also for income generation (Mander, 1998; Fennell *et al*., 2004; Shackleton and Shackleton, 2004; Shackleton *et al*., 2007). Despite this critical role in meeting primary healthcare needs and offering of alternative income source, medicinal plants are facing an unprecedented extinction threat as most of the traded medicinal plant materials are destructively being harvested from wild populations (WHO, 1993; Williams *et al*., 2000; Mander and Le Breton, 2005; Keirungi et Fabricus, 2005; Canter *et al*., 2005; Lange, 2006; Schippmann *et al*., 2006). Commercial harvesting, often by the poorer members of the communities and habitat destruction have been pointed out as the main causes of medicinal plant depletion (Schippmann *et al*., 2006; Williams *et al*., 2007). This, in turn, is threatening the entire traditional health systems as well as lives and livelihoods of millions of people in developing countries (Maundu *et al*., 2004). Consequently, cultivation and sustainable harvesting have been suggested as means to reduce the pressure on some wild population of medicinal plants (Cunningham 1993; WHO/IUCN/WWF, 1993; Geldenhuys, 2004; Canter *et al*., 2005; Keirungi and Fabricius, 2005; Schippmann *et al*., 2006; Wiersum *et al*., 2006).

However, apart from biological and ecological requirements (soil, interaction with pollinators and other species, slow growth rates, low germination rates) (Schippmann *et al*., 2006), economic returns to farmers, social and cultural considerations of resource users are other key factors determining whether cultivation would be practical (Mander, 1998; Cunningham *et al*., 2002; Keirungi and Fabricius 2005). Local beliefs, the attitudes of resource users toward cultivated medicinal plants and the economic potential of medicinal plants that can be brought into cultivation need to be assessed before any cultivation initiative.

Accordingly, this chapter attempts to: (1) capture the opinions of traditional healers, traders and collectors on cultivation and cultivated medicinal plants; (2) assess informants' awareness on medicinal plant depletion; (3) understand the dynamics of medicinal plant demands; (4) assess the availability of substitutes for the most traded/used species; and (5) to determine resource users' awareness on the protection status of traded/used medicinal plants.

These objectives are premised on Cunningham's (2001) observation that resource users are often aware of resource scarcities long before conservationists. This is because they are familiar with their local vegetation (Cunningham, 2001).

5. 2. Results

The following sub-sections present the findings of the last objective of the study. Informants' opinions about medicinal plant depletion, awareness on conservation status of some species of medicinal plants and perception on cultivation and cultivated species of medicinal plants are objectively presented. In addition, the needs of the respondents and challenges that they face on the daily basis in practising medicinal plants-related activities are also presented under this results' section. Procedures used in gathering and analysing data to address this third objective of the study are described in Chapter 1, section 1.6.

5. 2. 1. Depletion and protection status awareness

Awareness on the depletion of medicinal plant species from wild stocks showed 83% (n=92) of the respondents to be aware of the problem with only17% (n=19) who have not noticed any change in the wild stocks. Forty-eight percent (n=38) of the respondents attributed this depletion to over-harvesting, 27% (n=21) of the respondents pointed out bad harvesting methods as the main cause of depletion and habitat transformation was reported by 10% (n=8) of the respondents. Similarly, 10% of the informants noted increasing number of interest groups, while 5% (n=4) reported climate change as a driver in the depletion of medicinal plants (Tab. 5a).

Table 5a: Depletion awareness and rationale for the depletion of some medicinal plants

Awareness	Rational for depletion	Proportion
Yes		**83% (n=92)**
	Habitat transformation (agriculture, infrastructure)	10% (n=8)
	Unsustainable harvesting methods employed by collectors	27% (n=21)
	Over-harvesting	48% (n=38)
	Increasing number of interested groups (collectors, traditional practitioners and traders)	10% (n=8)
	Other (climate change, fire…)	5% (n=4)
No		**17% (n=19)**

Asking about the protection status of traded species, 79% (n=92) of the informants stated that they knew the conservation status of some species, while 21% (n=25) did not know (Fig. 5a). Thirty-eight percent (n=11) of the respondents who were partly involved in the trade of medicinal plants did not know the conservation status of traded plants, whereas only 16% (n=13) of the respondents fully involved were ignorant of the status of their products. Consequently, there is a significant difference (p=0.01618) between the protection status awareness of traded species and the time of involvement in the trade of medicinal plants (Fig. 5b).
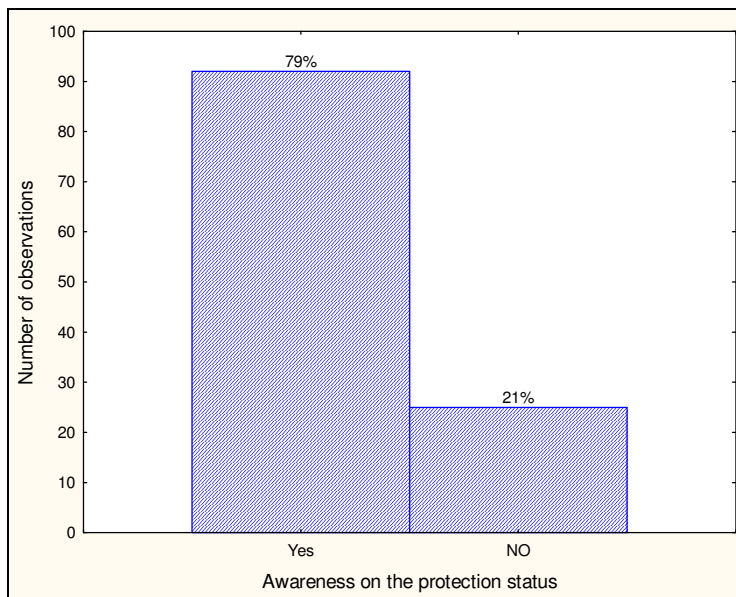
Figure 5a: Awareness on the protection status of traded/used species
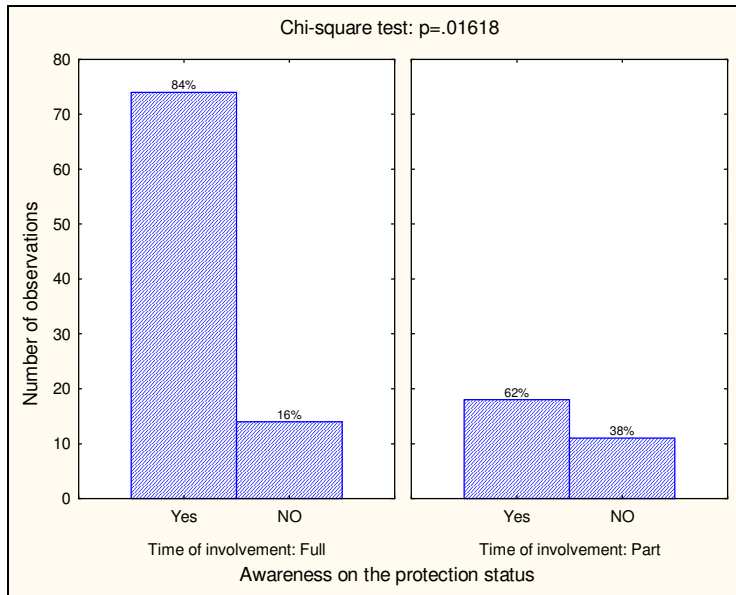
Figure 5b: Effects of the time of involvement on the protection status awareness of traded species

5. 2. 2. Perceptions of the future demand for medicinal plants

Examining the dynamics of future demand for medicinal plants showed that 80% (n=89) of the respondents expected an increase, 12% (n=13) a decrease and 8% (n=9) a stability in the current demand. Forty-one percent (n=23) of the respondents attributed the likely increase to the growing popularity of traditional healthcare systems and 23% (n=13) to the failure of western medicine to cure certain diseases and ailments. Twenty-seven percent (n=15) of the respondents attributed this future increase to the ascending number of consumers, traditional practitioners and commercial collectors. The remaining 9% (n=5) pointed out poverty and the high price of western drugs as the probable causes for future increase in demand. Among the 12% of the respondents who predicted a decrease in demand, scarcity of certain species (45%: n=4), decreased access to the natural resources (33%: n=3) and the cost of transport (22%: n=2) were mentioned as major reasons for future decrease in supplies of medicinal plants. The justification of the respondents who opted for the stability in future demands was not sought (Tab. 5b).

Table 5b: Dynamics and rationale for future increases or decrease in medicinal plants usage

Dynamics of future demand	Rational for future increase/decrease	Proportion
Increase		**80% (n=89)**
	Increasing popularity of traditional medicine healthcare systems	41% (n=23)
	Increasing number of stakeholders: patients, traditional healers, collectors and traders	27% (n=15)
	Failure of western medicine to cure certain diseases and ailments	23% (n=13)
	Poverty and high price of western drugs	9% (n=5)
Decrease		**12% (n=13)**
	Scarcity of some medicinal plants in the wild	45% (n=4)
	Decreased access to the wild (protected areas)	33% (n=3)
	Poverty and increasing cost of transport	22% (n=2)
Same		**8% (n=9)**

Furthermore, when the respondents were asked to compare the quantities of medicinal plants that they are currently trading to that in the past, 66% (n=70) stated an increase, 6% (n=6) a decline and 28% (n=30) did not see any change (Fig. 5c). The respondents who stated a decrease or a stability in current demand compared to the past believed that there would be an increase in demand in the future. In fact, among the 28% (n=30) of the respondents who did not see any change between the current and past demands, 59% (n=13) predicted a future increase in demand. Similarly, among the 6% (n=6) of the respondents who stated a decrease in the current demand with regard to the past, 67% (n=4) believed in a future increase. As a result, there is a significant difference (p=0.00734) between the perceived past and current demands (Fig. 5d).
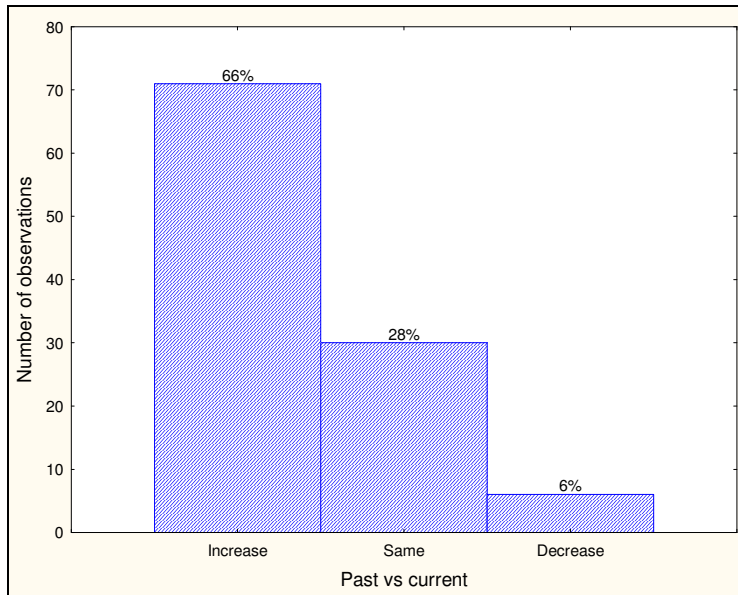
Figure 5c: Informant perceptions on current demand compared to the past
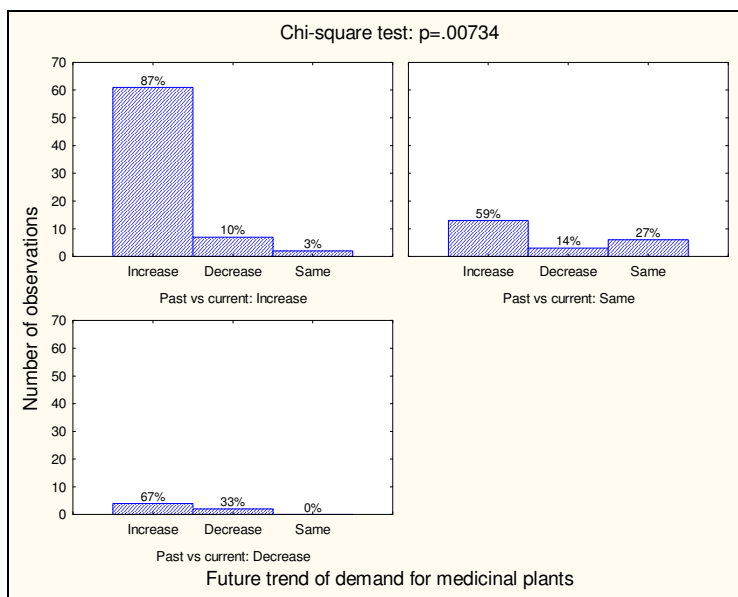
Figure 5d: Informant perceptions on future demand compared to current

There is also a significant difference (p=0.0276) between the income generated from the trade and the reasons proposed for future increase in demand for medicinal plants (Fig. 5e). Respondents with high incomes attributed the future increase to the increasing number of interest

groups, while those with low incomes attributed it to the failure of western medicine to cure certain diseases.
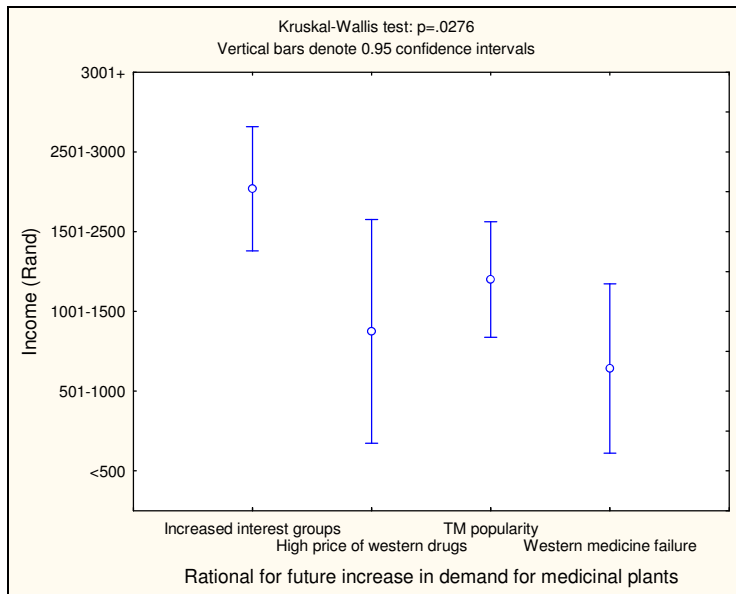
Figure 5e: Effects of income on justifications for future increases in demand for medicinal plants

5. 2. 3. Perceptions on the depletion of medicinal plants

Assembling the informants' opinions on what they would do if traded species could no longer be found in their current harvesting places showed that 84% (n=92) of them thought that they would seek for other places (some of them are already doing so), 11% (n=12) of them would close down their medicinal plant-related activities and 5% (n=6) of them believed that medicinal plant stocks are inexhaustible irrespective of harvesting pressure (Fig. 5f). Eighty-three percent (n=95) of the respondents mentioned the existence and the use of substitutes for some medicinal plant species (Fig. 5g).
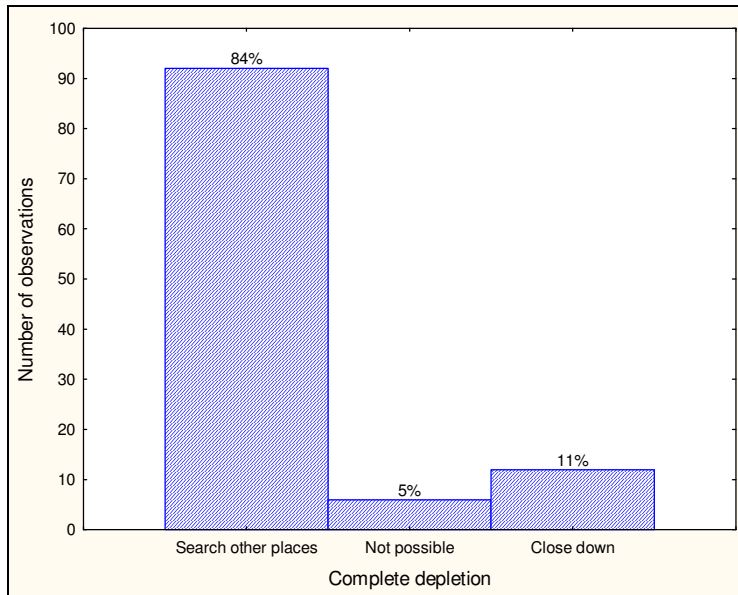
Figure 5f: Perceptions on complete depletion of medicinal plants
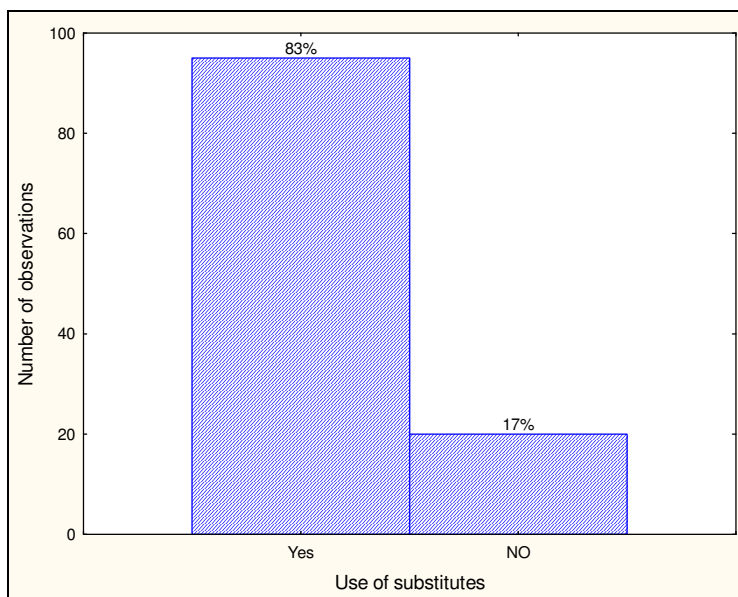
Figure 5g: Use of substitutes for the most traded/used medicinal plant species

It is worth noting that there is a significant difference (p=0.03247) between the time of involvement and the use of substitutes. For example, 31% (n=9) of the respondents partly involved in the trade of medicinal plants did not use substitutes at all, whereas only 13% (n=11) of those fully involved in the trade and use reported this practice (Fig. 5h).
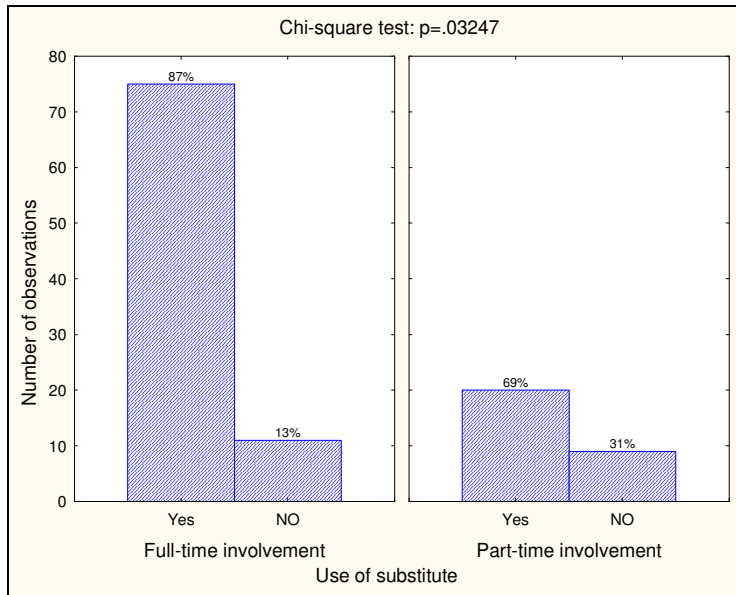
Figure 5h: Effects of time of involvement on the use of substitutes

There is also a significant difference (p=0.00681) between ethnicity and the opinions about the depletion of medicinal plants (Fig. 5i). None of the coloured respondents disagreed with the eventuality of complete depletion, while 8% (n=6) of the black respondents refuted it. In the same vein, there is a significant difference (p=0.002) between residence status (areas of birth) and opinions on complete depletion of medicinal plants in their current harvesting sites. Again, none of the native respondents denied this eventuality, but 9% (n=6) of the non-natives refuted the prospect of extinction of medicinal plants in the wild (Fig. 5j).
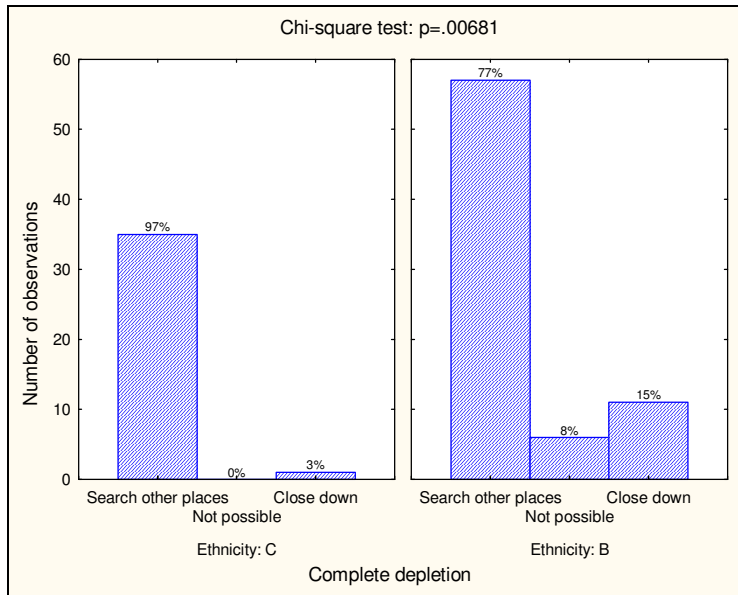
Figure 5i: Ethnicity and perceptions on complete depletion of medicinal plants
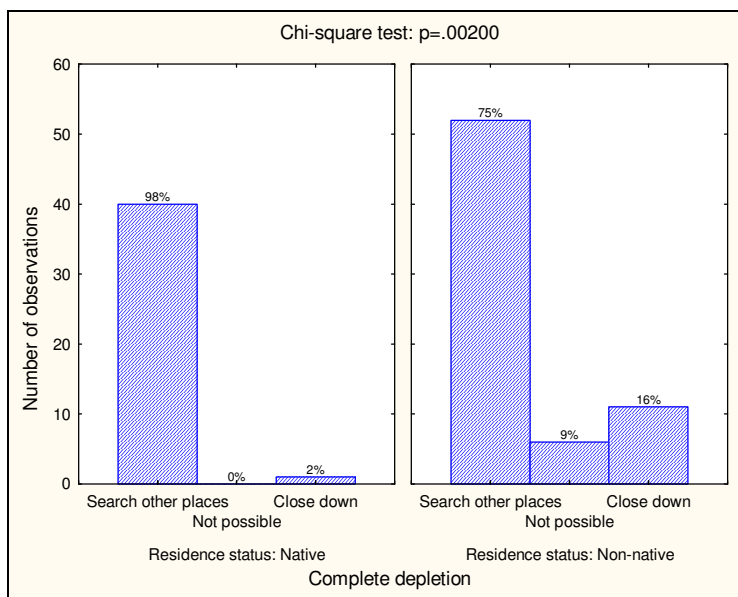
Figures 5j: Residence status and perceptions on complete depletion of medicinal plants

Furthermore, there is a significant difference (p=0.0046) between the position occupied in the trade and the perceptions on complete depletion of medicinal plants. None of the collectors/street traders refuted this possibility, whereas five traditional healers and one shop trader dismissed the livelihood of extinction. Among the respondents who would close down

medicinal plant business, 50% (n=6) were shop traders, 42% (n=5) were traditional healers and 8% (n=1) was a collector/street trader (Fig. 5k).
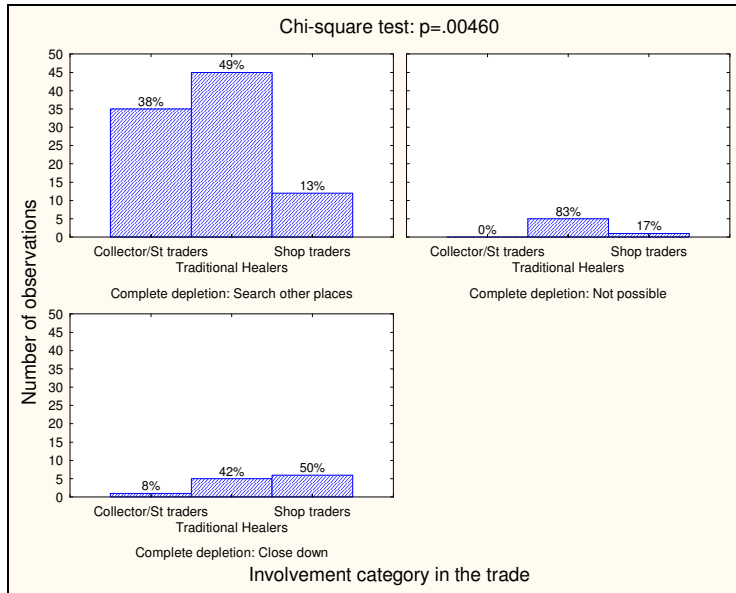
Figure 5k: Engagement category in the trade and perceptions on complete depletion of medicinal plants

5. 2. 4. Willingness to buy cultivated medicinal plants

An encouraging fact is that 78% (n=92) of the respondents expressed their willingness to buy cultivated medicinal plants, with only 22% (n=26) of the respondents who were reluctant to purchase cultivated species. Among the reasons mentioned for buying cultivated medicinal plants, 74% (n=45) would like to meet the growing demand and 18% (n=11) wanted to avoid conflicts with private land owners and protected area managers and to cut down traveling costs. The lack of healing power (38%: n=8), abundance of medicinal plants in the wild (24%: n=5), uncertainty on growing conditions (24%: n=5), cultural beliefs (9%: n=2) and uncertainty on price of cultivated species (n=1) were mentioned as reasons for not purchasing (Tab. 5c). This variability in responses is reflected in the significant difference (p=0.01223) between the willingness of informants to purchase cultivated medicinal plants and their means of supply for medicinal plants. All the respondents (n=8) who are currently buying their stocks from gatherers expressed willingness to purchase cultivated stocks. Only 11% (n=4) of those who are currently sourcing some of their stocks from the wild, home gardens and other collectors were not willing to buy cultivated medicinal plants. The bulk of respondents (29%: n=22) who would not buy

cultivated species are those who exclusively harvest their stocks from the wild populations (Fig. 5l).

Table 5c: Willingness and rationale for buying or not buying cultivated medicinal plants

Willingness to buy	Rationales for buying/not buying	Proportion
Yes		**78% (n=92)**
	Meet the increasing demand for some medicinal plants species that becoming scarce	74% (n=45)
	Avoid traveling and/or collection from private lands and protected areas	18% (n=11)
	Other	8% (n=5)
No		**22% (n=26)**
	Cultivated medicinal plant species lack healing power	38% (n=8)
	Medicinal plants are abundant in the wild	24% (n=5)
	Uncertainty on growing conditions (use of pesticides)	24% (n=5)
	Cultural beliefs not do not allow to purchase medicinal plants (cultivated or wild collections)	9% (n=2)
	Uncertainty on prices of cultivated plants	5% (n=1)
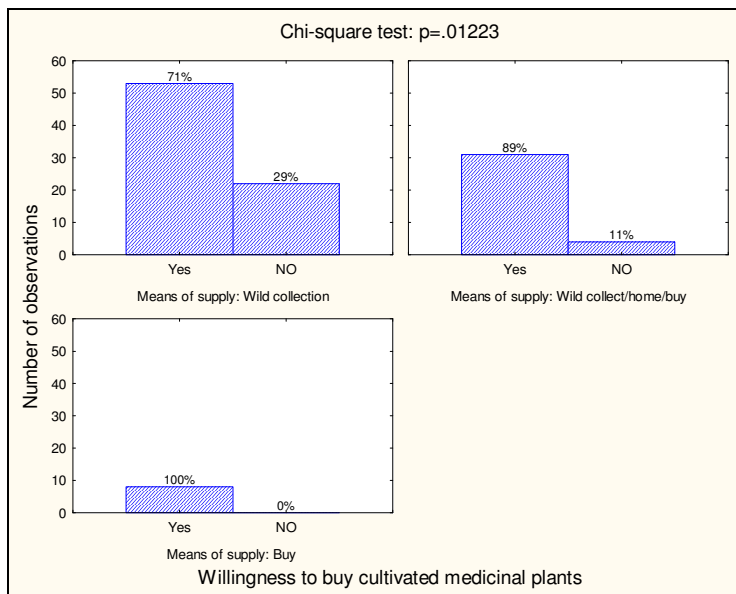
Figure 5l: Means of supply and willingness to buy cultivated medicinal plants

5. 2. 5. Willingness to grow some medicinal plant species

Ninety-four percent (n=111) of the research respondents stated that they would cultivate some of their most used species if seeds were freely provided. Only 6% (n=7) stated that they would not cultivate medicinal plants even if seeds were freely provided to them. Thirty-six percent (n=29) of the respondents motivated their willingness to meet the growing demand and 34% (n=28) to avoid collection from private land and protected areas and also to reduce traveling cost. Fourteen percent (n=11) of the respondents would grow medicinal plants provided that a piece of land was given to them. Furthermore, 12% (n=10) of the respondents justified the interest in home gardens and the remaining 4% (n=3) stated that they were undertaking cultural preservation by planting natural remedies. Those who refused to grow medicinal plants pointed out the lack of healing power in cultivated species and the absence of land (Tab. 5d).

Table 5d: Willingness and rationale for growing or not growing medicinal plants if seed are freely provided

Willingness	Rationale	Proportion
Yes		**94% (n=111)**
	Meet the increasing demand for some medicinal plants	36% (n=29)
	Avoid traveling and/or collection from private lands and protected areas	34% (n=28)
	Meet the increasing demand for some medicinal plants species and avoid going to private lands and protected areas (provided there is a piece of land for cultivation)	14% (n=11)
	Already involved in medicinal plants home garden	12% (n=10)
	Cultural preservation	4% (n=3)
No		**6% (n=7)**
	Cultivated medicinal plants lack healing power	67% (n=2)
	There is no land to undertake cultivation	33% (n=1)

A significant difference (p=0.01938) exists between ethnicity and the willingness to cultivate some medicinal plants if seeds are freely provided (Fig. 5m). Nine percent (n=7) of the black respondents rejected the idea of cultivation, whereas all the coloured respondents supported this alternative. Similarly, there is a significant difference (p=0.00915) between residence status and the willingness to cultivate medicinal plants if seeds are freely provided. None of the native respondents rejected the proposition for cultivating medicinal plants, while 9% (n=7) of the non-natives were reluctant (Fig. 5n).
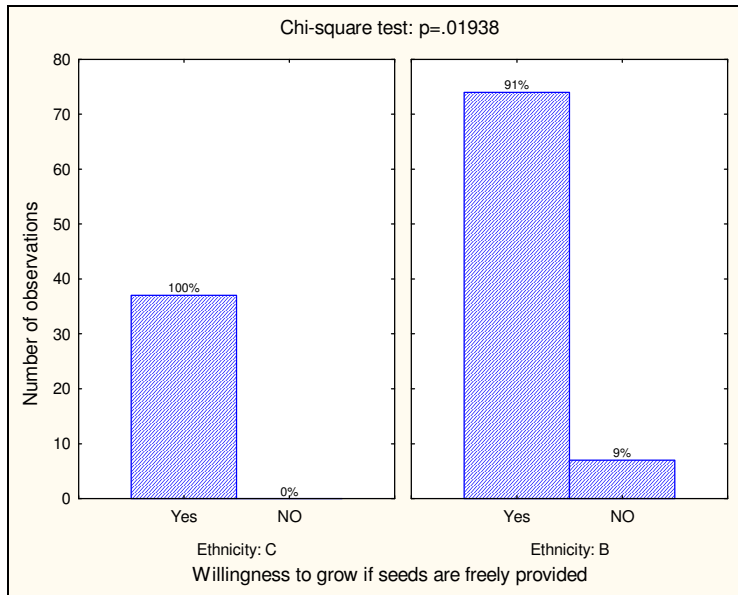
Figure 5m: Effects of ethnicity on the willingness to cultivate freely supplied seeds of medicinal plants
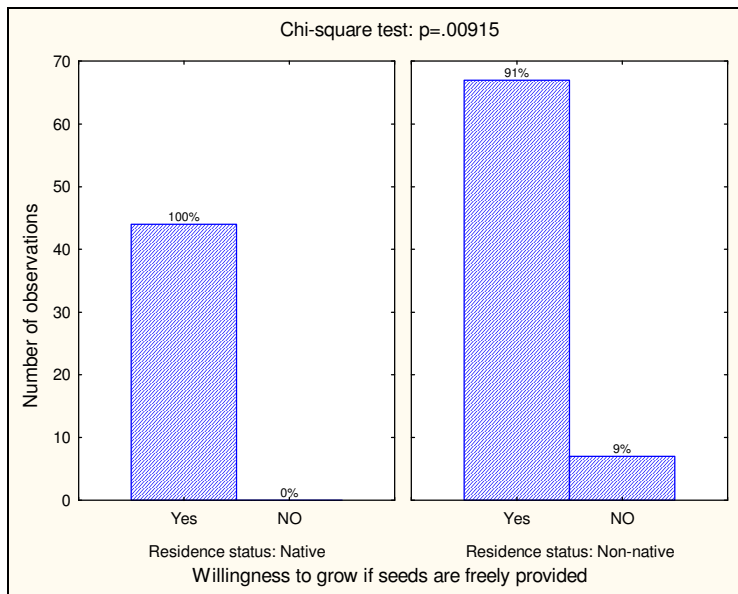
Figure 5n: Effects of residence status on the willingness to cultivate freely supplied seeds of medicinal plants

There is also a significant difference (p=0.0185) between the sources of supply and the willingness to grow medicinal plants. None of the respondents sourcing their stocks from the Western Cape and other regions including KwaZulu-Natal, Swaziland and Lesotho declined the

idea of cultivation. Contrarily, 17% (n=4) of the respondents deriving their stocks from the Eastern Cape Province and 8% (n=3) of respondents gathering their stocks from both the Eastern Cape and Western Cape provinces expressed reluctance to the cultivation of medicinal plants (Fig. 5o).
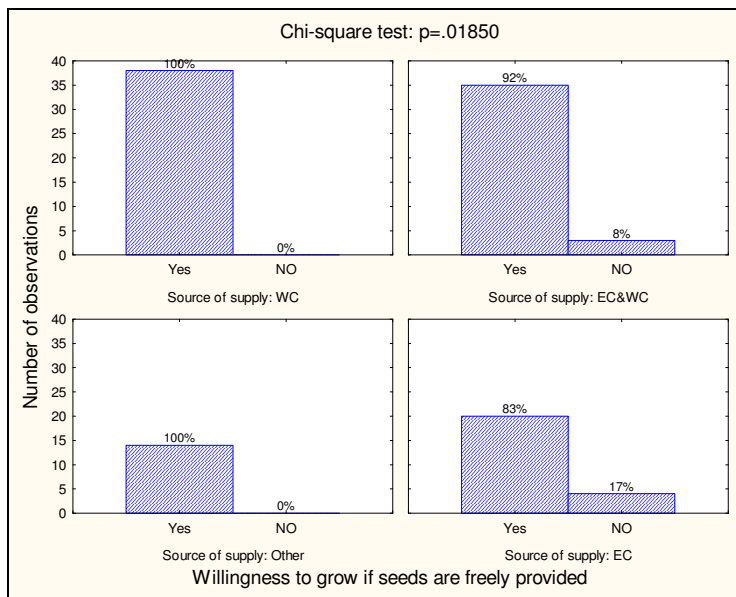
Figure 5o: Sources of supply and willingness to cultivate freely supplied seeds of medicinal plants

5. 2. 6. Challenges and needs

The respondents who were surveyed in this study expressed some needs and problems that they experienced on a daily basis in practicing medicinal plant-related activities. Thirty-six percent (n=40) of the participants expressed the need for land for cultivation, 32% (n=36) noted the difficulties of obtaining harvesting permits and license for street dealership. Fifteen percent (n=17) wanted financial and infrastructural support, 14% (n=15) desired the promotion of traditional medicine and collaboration with western medicine. Most importantly, 3% (n=4) of the participants would like the implementation of environmental education and training on sustainable harvesting techniques (Tab. 5e).

Table 5e: Needs and Challenges

Supports needed in order to improve the business	Proportion
Financial support and infrastructures	15% (n=17)
Easy obtaining of permit to harvest in protected areas and license to sell on the street	32% (n=36)
Traditional medicine promotion and collaboration with western medicine	14% (n=15)
Provision of land for cultivation of some medicinal plant species	36% (n=40)
Environmental education and training on sustainable harvesting methods	3% (n=4)

There is a significant difference (p=0.00094) between the expressed needs and the engagement category in the trade. None of the shop traders mentioned the desire for land for cultivation as a concern. Financial and infrastructural supports were the main concerns. Collectors/street-traders and traditional healers expressed interest in all the above mentioned needs (Fig. 5p). It is worth noting that 81% (n=35) of the respondents native to the Western Cape noted the presence of outside collectors in their harvesting places (Fig 5q).
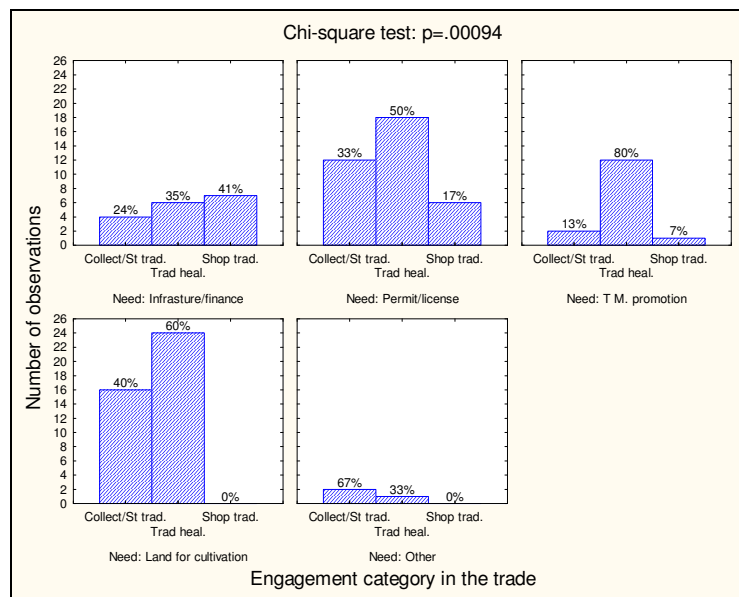
Figure 5p: Involvement category in the trade of medicinal plants and the needs of the respondents
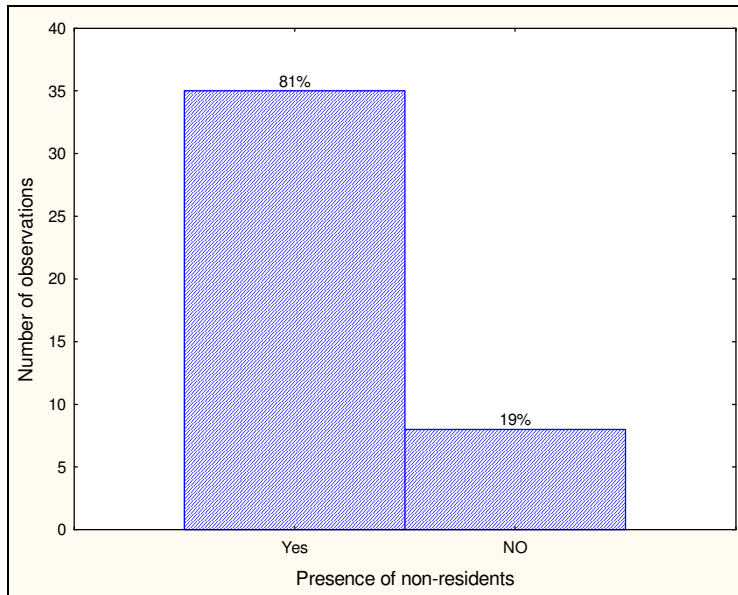
Figure 5q: Presence of outsider gatherers

5. 3. Discussion

It is well established that education, including both formal and informal education, public awareness and training is indispensable in changing people's attitudes, promoting sustainable development and improving the capacity of the people to address environmental and development issues (UNCSD, 1992; CBD; 1992). It is also widely acknowledged that indigenous people and their communities, due to the historical relationship with their lands and natural resources, are aware of the status of their natural resources (Cunningham, 2001; Shanley and Luz, 2003). Accordingly, the following sections assess and discuss local people's perceptions on the abundance of medicinal plants, protection status of traded species and perceptions on cultivation and cultivated medicinal plants in the Cape Peninsula, South Africa.

5. 3. 1. Awareness on depletion of medicinal plants

Local people and resource users are key partners for effective conservation and management of valuable plants prone to over-harvesting. Their familiarity with their natural environment makes them aware of the status of their resources long before conservationists (Cunningham, 2001; Shanley and Luz, 2003; Shukla and Gardner, 2006). Consistent with this observation, the majority (83%) of the respondents acknowledged a decline in the proportion of certain medicinal plants and 75% of them attributed this decline to over-harvesting and poor

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harvesting methods. Over-harvesting and harvesting methods have often been cited among causes of medicinal plant scarcity. For example, in the Faraday Medicinal Plant Market in Johannesburg, one-third of medicinal plant traders admitted over-harvesting as the main reason for medicinal plant scarcity (Williams, 2002). In the Amatola region in the Eastern Cape Province, respondents mentioned over-harvesting (80%) and poor harvesting methods (15%) as driving factors to medicinal plants decimation (Wiersum *et al*., 2006). In the Eastern Amazonia, respondents pointed out destructive harvesting techniques alongside logging as the underlying causes of medicinal species scarcity (Shanley and Luz, 2003). Interestingly, in Tanzania, after acknowledging their active role in the depletion of medicinal plants, 81.2% of traditional healers requested sustainable harvesting training as a means of mitigating further threats to medicinal plants (Mahonge *et al*., 2006). In the present study, only 3% of the respondents showed an interest in environmental education and training. Some Rastafarian respondents claimed practicing "responsible" harvesting. They argued that only needed quantities are harvested and no harvesting takes place during production periods. However, destructive harvesting such as the collection of the whole plant or uprooting of some bulbous species is common among harvesters.

Despite the fact that the majority of the respondents attributed over-harvesting and destructive harvesting methods as the main cause of medicinal plant depletion, agriculture, forestry plantations, urbanization and invasive alien plants are believed to contribute the most to biodiversity loss in the Cape Floristic Region (Latimer *et al*., 2004; Dalgliesh *et al*., 2004). These factors were revealed by only 10% of the respondents.

The shift from subsistence to income generation harvesting has been pointed out as the main driving force to the over-harvesting of valuable non-timber forest products such as medicinal plants (Williams, 2002; Sunderland *et al*., 2004; Williams *et al*., 2007). Asking informants what they would do if used species could no longer be found in the wild showed that 84% of them would seek other harvesting locations and only 11% would close down their activities if resources become scarce. In the Faraday Market in Johannesburg, when traders of medicinal plants were asked the same question, 15% stated that they would find alternative employment or become unemployed. Eighty-five percent of them mentioned that they could accommodate the shortages and continue trading (Williams, 2002). This implied that they would look for other harvesting or supplying places as shown by the 84% of the respondents from this study.

Of concern to this study is the five percent of the respondents, who are mainly traditional healers (83%) and thought that medicinal plant extinction is impossible irrespective of the harvesting pressure. Despite the evidence of increasing habitat transformations, combined with environmental education programs (CapeNature, 2007), these stakeholders argued that medicinal plants are "God's creation" and as such could not vanish whatever the pressure. This view was also mentioned by traders at the Faraday Market. Indeed, when traders were asked what they did to ensure that there would be plants to sell in the future, 30% claimed practicing "non-destructive" harvesting, 20% replied "nothing", and as in this present study, five percent stated that plant scarcity was impossible (Williams, 2002).

An encouraging fact is that none of the respondents native to the Western Cape Province, who would be the most affected by medicinal plant scarcity, refuted the idea of complete depletion of medicinal plants in the face of overexploitation. Some of them are currently experiencing species scarcity and others have even reported searching for other harvesting places. Among the respondents who would close down, 50% are shop traders and 48% are traditional healers. All these groups consist of non-native respondents, which partly supports their involvement for economic considerations and confirms the view of a rapidly increasing urban migration of traditional practitioners to commercialize their services (Cunningham, 1993; Sunderland *et al*., 2004).

What is interesting from the conservation point of view is that 83% of the respondents have mentioned the existence of substitutes for the most used species despite the fact that the majority of them did not want to disclose the identities of these substitutes, especially traditional healers. Some of the respondents reported that the use of substitutes depends on the ailment to be treated.

This study has also revealed that the knowledge on substitutes is influenced by the time of involvement. Thirty-one percent of informants partly involved do not know of any substitute to their most traded species compared with only 13% of the respondents who are fully involved in the trade of medicinal plants. The time of involvement could justify this trend. Nevertheless, the findings of this study contrast with the results found by Quinlan and Quinlan (2007) in rural Dominica on knowledge about medicinal plants. In fact, these authors found that respondents with commercial occupation (those partly involved in medicinal plants-related activities) were more knowledgeable of the concerns around medicinal plants and listed more medicinal plants

than did villagers who were fully involved in medicinal plant-related activities. They justified this trend by the fact that people who are around much of the time would become more knowledgeable, especially about an important topic such as healthcare.

In addition, despite the fact that the majority (79%) of the informants claimed to know the legal protection status of traded medicinal plants through their local associations, media or conservation agencies, 38% of the informants partly engaged (compared to only 14% of the respondents fully involved) are not aware of the protection status of plants that they are dealing with. However, knowing the protection status of some species does not necessarily prevent some respondents from trading certain endangered species. *Haworthia sp*, *Ilex mitis*, *Kniphofia sp* and *Stangeria eriopus* are among those protected species (Western Cape Provincial Government, 2000) which are traded in the Cape Peninsula.

5. 3. 2. Perceptions about the future demand for medicinal plants

Over the past 50 years, human use of all ecosystem services has grown rapidly, largely to meet the increasing demand for food, freshwater, timber, fiber and so forth (Millennium Ecosystem Assessment, 2005). In fact, the Millennium Ecosystem Assessment predicts a further degradation of these services by 2050. Habitat transformation, over-exploitation, invasive alien species, pollution and climate change were pointed out as the most important direct drivers of biodiversity loss and ecosystem services degradation worldwide. In agreement with this observation, the majority (80%) of the respondents believe in an increase in demand for medicinal plants in the future. Even the informants who did not see any change or stated a decrease in the current demand with respect to the past predicted an increase in their demand for medicinal plants in coming years. This trend was also observed in KwaZulu-Natal (Mander, 1998). For example, while assessing the dynamics of demand for indigenous medicine, 90% of traditional healers and the majority of shop traders reported the demand to remain high.

Respondents have mentioned several reasons for this expected increase. Forty-one percent attributed this increase to the increasing popularity of traditional healing systems; 23% to the failure of western medicine to cure certain diseases; 27% to increasing numbers of users, practitioners and commercial gatherers; and the remaining 9% to poverty. From his discussions and observations of the markets in southern Africa (South Africa, Mozambique, Swaziland, Lesotho, and Namibia), Mander (1998) identified five foremost reasons that keep the demand for

indigenous medicine high. The factors that pushed up the demand for natural remedies included population growth (2.4% per year throughout the southern Africa), the widely held views by black community that certain illnesses are culturally related, poverty and insufficient provision of western medicinal facilities in rural areas. Specifically to South Africa, he mentioned the recent legal recognition of traditional healing systems, after years of discrimination by previous apartheid policies, as additional motive for the increase in demand for medicinal plants (Mander, 1998). Some of the above factors were also mentioned by the informants to justify the ongoing increase in the use of medicinal plants, hence traditional healthcare.

The increasing popularity of traditional healthcare systems is not only discernible in southern Africa or South Africa. It is estimated that up to 80% of the population in developing countries makes use of traditional healthcare systems for their primary healthcare needs. Still, the use of natural remedies through alternative or complementary medicine (CAM) is increasing in developed countries. In Germany, for example, which is the centre of international trade for medicinal and aromatic plants, 90% of the population has used a natural remedy at some point in their life. In Canada, 70% of the population has used complementary medicine at least once (WHO, 2006). This trend is also observed in Italy, Switzerland, Australia, United States of America and Sweden (Giannelli *et al*., 2007; Wapf and Busato, 2007; Tiralongo and Wallis; 2008; A Lie and Boker, 2006; Sundberg *et al*., 2007). Moreover, in those developed countries, there is an increasing interest in integrating complementary/alternative medicine instruction into allopathic (conventional) medical education. In Germany, between 1995 and 2000, the number of doctors who had undergone special training in natural remedy had almost doubled (WHO; 2006). In the USA, medical students demonstrated positive attitudes towards the introduction and the integration of CAM into allopathic medical education (A Lie and Boker, 2006). In Sweden (Sundberg *et al*., 2007) and North America (Vohra *et al*., 2005), models for CAM and conventional medicine were on route. Consistent with these observations, 14% of the respondents mentioned the promotion and the collaboration between traditional medicine and conventional medicine as their main needs. In developing countries, successful examples in intercultural health are given by Suriname and Ecuador (Mignone *et al*., 2007).

Relating to the increasing number of consumers, traditional practitioners and commercial gatherers, Mander and Le Breton (2005) estimated up to 100 million consumers of traditional remedies and as many as 500,000 traditional healers in southern Africa. Up to 70,000 tons of

plant material, estimated up to US$ 150 million, are consumed per annum. In South Africa, 20,000 tons of medicinal plants material, valued at US$60 million (R 270 million), is being consumed by about 27 million people annually. Furthermore, in KwaZulu-Natal alone, up to 30,000 of people are deriving incomes from the trade of non timber forest products (NTFPs), including medicinal plants (Mander, 1998). Given the fact that the bulk of traded species is coming from wild populations, cultivation and sustainable harvesting are urgently needed.

5. 3. 3. Perceptions about cultivation and cultivated medicinal plant species

The huge pressure created by the commercial wild collection of medicinal plants has motivated certain stakeholders to suggest cultivation as an alternative to wild procurement (Cunningham 1993; WHO/IUCN/WWF, 1993; Geldenhuys, 2004; Canter *et al*., 2005; Keirungi and Fabricius, 2005; Wiersum *et al*., 2006). However, social, economic and cultural conditions of resource users are believed to influence the success and the feasibility of medicinal plant cultivation (Mander, 1998; Keirungi and Fabricius 2005). It was therefore important to understand how traditional healers, traders and other medicinal plant users felt about cultivated species before suggesting cultivation programs.

Investigating the informants' perceptions on cultivated medicinal plants showed that 78% of the respondents are willing to buy and make use of cultivated species. This attitude of stakeholders toward cultivated medicinal plants was also observed in other regions of South Africa. For example, in the Eastern Cape Province, 82% of the urban-based healers and 69% of clinic patients reported that they would readily make use of cultivated medicinal plants (Dold and Cocks, 2002). Again, in the Amatola region of the Eastern Cape Province, 89% of the respondents demonstrated their willingness to use cultivated medicinal plants (Wiersum *et al*., 2006). At the Faraday Medicinal Plant Market in Johannesburg, Williams (2002) reported that 80% of traders would buy cultivated medicinal plants provided that they are less expensive than the cost of harvesting by themselves or buying from gatherers. Only one respondent evoked the high cost of cultivated species as a concern in the present study.

Ninety-four percent of the respondents would grow some of the most used medicinal plants if seeds were freely provided to them. However, among the 94% of the respondents willing to grow medicinal plants, 14% tied their willingness to the availability of of land. Land was not an issue in Grabouw, where most of the traditional healers have a medicinal plant home

garden, but in Paarl and other visited locations land was the major obstacle to domestication. The provision of land for cultivation was also mentioned by the majority (36%) of the respondents as their main need.

Informants have mentioned several reasons to justify their willingness to buy cultivated medicinal plants and to cultivation. Meeting the increasing demand for some species currently under-supplied, cutting traveling cost and avoiding collection from private lands and protected areas were the main motivations for 92% of the respondents to buy medicinal plants. The same reasons were mentioned by 84% of the respondents who would grow some species of medicinal plants. In Cameroon, stakeholders mentioned cash earning among the motivations to engage in the planting of *Prunus Africana* (Cunningham *et al*., 2002). In the Machakos District of Kenya, traveling distance was among the rationale for growing some scarce species in the homestead (Musila *et al*., 2004).

Apart from guaranteeing a steady source of raw material, as mentioned by the respondents, Schippmann *et al*. (2006) argued that cultivation provides reliable botanical identification. Indeed, wild collection often offers adulterated material, especially when the supply of a certain species does not follow the demand. This can justify the use of substitutes as mentioned by the respondents. For example, in the absence of *Alepidea amatymbica*, which does not grow in the Western Cape, some Rastafarians are using *Alepidea delicatula*. Both species are commonly known as Kalmoes among the Rastafarians.

Although the majority of the respondents who have displayed a positive attitude towards cultivated medicinal plants, 22 respondents were not willing to buy cultivated medicinal plants. The majority of them consisted of informants who are currently harvesting all their stock from the wild populations. The lack of "healing power" of cultivated medicinal plants is the main reason mentioned by the respondents who would not buy or cultivate them if seeds were freely granted. Some traditional healers argued that when a species is touched by "impure people" it loses its effectiveness and that collection from the wild is an essential part of the ritual. In the Amatola region of South Africa, 24% of traditional healers also reported that cultivated medicinal plants were highly susceptible to losing their effectiveness when touched by polluted people. According to those traditional healers, "polluted people" are those who would handle medicinal plants during menstruation, after sexual intercourse, after childbirth and when there is a death in the household (Wiersum *et al*., 2006). In Botswana, traditional medicine practitioners

reported that cultivated material was unacceptable due to their lack of power (Cunningham, 1993). Of more concern are those traditional medical practitioners from the District of Machakos in Kenya who argued that it was an abomination to artificially cultivate any naturally growing plant (Musila *et al*., 2004).

Besides these metaphysical considerations, scientific studies partly support the low content of active ingredients in cultivated plants. In fact, active ingredients used for medicinal purposes, derive from secondary metabolites. These secondary metabolites which the plants need in their natural habitats are synthesized under particular conditions of stress and competition which perhaps would not be expressed under monoculture conditions. Consequently, "active ingredient levels can be much lower in fast-growing cultivated stocks, whereas wild populations can be older due to slow growth rates and can have higher levels of active ingredients"(Schippmann *et al*., 2006: 81). For example, analyses of 144 samples of *A. lancea* with similar morphological features, collected from four sites in the Jiangsu Province in China, revealed at least two variations in terms of the presence or absence of various chemical constituents (He and Sheng, 1997). Azaizeh *et al*. (2005) also reported a similar case in Israel. This is not to discredit the planting of medicinal plants, as many attempts have been successful, but to highlight the complexity of the various issues involved in the conservation and cultivation of medicinal plants.

5. 4. Conclusions

As elsewhere, there is a concern about medicinal plant depletion in the Cape Peninsula. The majority of the respondents were aware of the decreasing availability of medicinal plants from the wild populations. Although agriculture remains the main driver of biodiversity loss in the study area, the majority of the respondents pointed out over-harvesting as the main contributing factor to medicinal plants exhaustion instead. Despite this ongoing depletion, the majority of respondents predicted an increase in demand and usage for medicinal plants in the future. Some interviewed stakeholders mentioned the existence of substitutes for harvested species; however, the majority of them did not want to disclose their identities.

Chapter 6: Conclusions and recommendations

6.1. Introduction

It has been demonstrated that throughout the world rural households make extensive use of biodiversity to fulfil their subsistence requirements and also for income generation (Cunningham, 2001; Shackleton and Shackleton, 2004). While the income generated from the trade of natural resources may be supplementary for some households, they are often the primary source of income for other households (Shackleton and Shackleton; 2004). Medicinal plants are among the most actively used and traded plants for income.

The use and the trade of medicinal plants are no longer restricted to rural households, which are often characterised by low income and educational levels. Today, the use and the trade of medicinal plants have conquered urban areas and all strata of the society, including high income earners and highly educated member of the society (Cunningham, 1993). Harvesting of medicinal plants is not generally a problem at village-level consumption (Hamilton *et al*., 2006). However, with the growing population in urban areas, which creates huge demand on resources, combined with the massive involvement of commercial harvesters, wild harvesting of medicinal plants has become a destructive activity (Cunningham, 1993). Therefore, documenting the trade/use by reporting not only priority species, but also profiling resource users along with their socio-economic status is perceived to be vital for the sustainable management of biodiversity (Cunningham, 2001; Hamilton, 2005).

In line with the preceding view, this study was initiated to investigate the trade of medicinal plants in the Cape Peninsula and its surroundings. Thirteen locations were visited within the study area and 131 people were interviewed. The overall objectives of the study were to: (1) inventory and document the most traded/used species of medicinal plants; (2) understand socio-economic attributes of stakeholders who were traders, collectors and traditional healers; and (3) to capture stakeholders' perceptions on some alternatives to wild harvesting of medicinal plants such as cultivation, domestication and the use of cultivated species of medicinal plants.

6. 2. Conclusions

The following sub-sections summarise the main findings of the investigation under the three key objectives of the study outlined in the first chapter of this research report.

6. 2. 1. Socio-economic characteristics of stakeholders

Contrary to other South African urban areas where women dominate the informal trade of medicinal plants, in the Cape Peninsula, the trade of medicinal plants is mainly the domain of their male counter-parts. Involvement categories such as collectors, street traders and shop traders were in large held by males, while the majority of traditional healers were female. The bulk of surveyed respondents could still fit the informal employment sector considering their age. Younger respondents tended to be partly involved in the trade of medicinal plants as opposed to older people who were fully involved. Moreover, younger participants were predominant as collectors, street traders, while older stakeholders were dominant as shop traders and traditional healers. Female respondents tended to become involved in the trade at later stages and they appear to stay longer than male respondents.

The findings of this study also show that participation in medicinal plant related-activities was not only motivated by cultural considerations, but also by social and economic conditions faced by stakeholders. In fact, cultural beliefs and traditions were the main rational for the involvement of the majority of the surveyed informants. This is not surprising as it is well established that traditional medicine and medicinal plants are important part of traditions and cultures of African people (Cunningham, 1993; Wiersum *et al.*, 2006). The majority of the surveyed respondents were unemployed (formal sector) and had many dependents to take care of. The bulk of them attained secondary education and were in working age category, which could qualify them for some job opportunities in the formal sector. Regrettably, a large number of them could not find any job in the formal sector. Thus, in the absence of any job opportunities in the formal sector, their involvement in the trade of natural resources such as medicinal plants for income generation may be justified. Indeed, some informants, especially among the native coloured respondents, clearly justified their involvement as purely economically motivated. Paradoxically, although the majority of non-native respondents (predominantly traditional healers) justified their involvement as culturally motivated, a large number of them acknowledged not only making living through the trade of medicinal plants, but also enjoyed

high returns from medicinal plants related-activities throughout the year. These latter findings tend to support Cunningham's (1993) view about the increasing migration of traditional health practitioners to urban areas to commercialise their services.

6. 2. 2. Overview of medicinal plant species in trade/use in the Cape Peninsula

Although the trade of medicinal plants in the Cape Peninsula is not intensive in comparision to other regions of South Africa such Johannesburg and Durban where it has been reported that more than 500 and 400 species are traded, respectively, the use of this important natural resource is still well established in the region. About 170 species were actively traded/used during the time of this study. This figure only represents those species that the respondents have nominated among their top 10 most traded/used species. Therefore, the exact number of medicinal plants traded/used in the Cape Peninsula might indeed be higher than the reported figure. *Helichrysum* genus, *Agathosma spp.*, *Tulbaghia spp.*, *Hypoxis spp.*, *Alepidea spp.* are the most traded/used species in the Cape Peninsula.

A discrepancy in species preferences and ranking was observed between the Rastafarians and traditional healers. Equally, there was also a divergence between the top ranked medicinal plant species in the Cape Peninsula and those reported in surveys undertaken in Mpumalanga and KwaZulu-Natal. This observation stressed the importance of local surveys and justified the undertaking of this investigation.

It is suffices to state that the bulk of species traded/used in the Cape Peninsula is sourced from the wild populations. Western Cape and Eastern Cape vegetations act as the main source areas. However, few respondents also procure their stocks from KwaZulu-Natal, Lesotho, Northern Cape Province and Swaziland. Harvesting activities occur mostly throughout the year and stocks are constantly renewed every month, especially among Rastafarians who are mainly native to the Cape Peninsula.

The bulk of the plant parts traded/used consist of roots, bulbs, barks, tubers and in some cases the whole plant is uprooted. Species traded for their bark, rhizomes, roots, corms and bulbs were the most monetarily valued in the study areas. The Rhizome of *Bulbine latifolia*, the bulb of *Haemathus spp.*, the corm of *Hypoxis spp.* and the roots of *Alepidea spp.* were the most valued species among Rastafarian communities. Species imported from other provinces or countries

were also more costly. It was difficult to assess the value of a single medicinal plant species traded by traditional healers, as most of the products consisted of mixtures from several species.

The question that one may ask is wheter the species of medicinal plants traded or used in the Cape Peninsula are sustainably harvested. Indeed, sustainable harvesting, as mentioned by Struhsaker (1998), refers to activities involving the extraction of a natural resource in a manner that does not deplete the resource, but rather contributes to its regeneration so that similar level of material can be used indefinitely. Destructive harvesting, which includes the removal of bark, roots, wood and the whole plant, and over-harvesting are among factors contributing to resource depletion (Cunningham, 1996; Cunningham, 2001). For example, species such as *Warburgia salutaris, Ocotea bullata* and *Curtisia dentate* were reported to have become scarce from South African forests due to over-exploitation, which was driven by active trade of their barks (Geldenhuys, 2004). Similarly, in this study, the majority of the respondents attributed the depletion of medicinal plant resources from the wild stocks mainly to over-harvesting. In addition, the bulk of inventoried species are traded/used for their vital parts. This investigation has also revealed that the majority of informants harvested their stock of medicinal plants on a monthly basis. Substituting one species with another is believed to be a warning sign for increasing scarcity (Cunningham, 2001). This was true when *Waburgia salutaris* became scarce. *Cryptocarya spp*. and *Cinnamomum camphora* were used as substitutes for *O. bullata* (Geldenhuys, 2004). Despite their reluctance to disclose the identity of substitutes, the majority of respondents in the present study reported using substitutes for some species that became scarce. In addition, some stakeholders were geographically shifting harvesting locations to previously unexploited areas to procure species that were becoming scarce. Of more concerns is that some Red Data book listed species, which include vulnerable, critically endangered and species believed to be declining from the wild and some endemic species such as *Agathosma crenulata* and *A. betulina* were among the traded/used species within the study area. From the above findings, combined with author's personal observations, one can confidently deduce that medicinal plants traded/used in the Cape Peninsula are unsustainably harvested.

6. 2. 3. Stakeholders' awareness and willingness to overturn the ongoing depletion of medicinal plants

Cunningham (2001) mentioned that local communities or resources users, due to their familiarity with their close environment, are aware of the state of their natural resources long before conservationists. This observation has proven to be true in the current study. Indeed, a large number of stakeholders acknowledged the depletion of medicinal plants from the wild. Despite the certainty that agriculture, infrastructure building and alien species constitute the main threats to biodiversity in the Cape Peninsula, overharvesting and inappropriate harvesting techniques have been pointed out as the main causes for the depletion medicinal plants. Of more concern is that despite this ongoing diminution of medicinal plant resources, an overwhelming number of informants predicted an increase in their medicinal plant demand as it has been the trend in recent years. With the lack of unemployment in the formal sector, it is predicted that this informal industry would attract more people in the near future. Fortunately, all the stakeholders have shown their willingness to use cultivated species and also to undertake cultivation as a sustainable way for meeting the increasing demand for medicinal plants. However, willingness to cultivate is tied to some needs such as free provision of seedlings, land and training. The satisfaction of these needs would not only contribute to the conservation of biodiversity or relieving pressure on wild stocks, but would also contribute to poverty alleviation.

6. 2. 4. Key findings of the study for the study

The first most important finding of this study is that apart from self-usage or domestic usage, medicinal plants are being traded in the Cape Peninsula. Documenting the trade of natural resources such as medicinal plants, by inventorying species in trade and profiling resource users, is believed to provide valuable information necessary for the management of these target species. Consistent with the management of biodiversity, this study provides a list of the most traded/used species of medicinal plants within the Cape Peninsula and surrounding areas. From this inventory, a list of threatened species, which are in urgent need of management, has been derived. Altogether, these lists constitute baselines for future studies aimed at sustaining the collection of medicinal plants. Secondly, the study reveals the profiles of stakeholders, which should be taken into account when elaborating protected area management plans. Thirdly, the study provides evidence of resource users' awareness of their natural environment and also their

concerns about the dwindling of used species from their natural habitats. Finally, this study provides evidence of resource users' willingness to ambrace some alternatives to overturn the ongoing depletion of wild populations of useful resources such as medicinal plants.

6. 3. Recommandations

The importance of biological diversity, including medicinal plants resources for the livelihoods, especially the rural poor, is well recognized. In the past, harvesting of medicinal plants was restricted to traditional health practitioners who were well known for their traditional conservation practices. However, today, the growing population, urbanisation, unemployment and the unrestricted collection of medicinal plants from the wild is leading to the over-harvesting of this valuable natural resource. In addition, concerns about the depletion of medicinal plants are heightened by the increasing involvement of commercial harvesters, mainly the unemployed whose main objective is to make more profit by collecting more resources. This was obvious in the current study, where some informants justified their involvement in the trade of medicinal plants for economic circumstances.

Despite the fact that habitat destruction and transformation remains by far the major cause of biodiversity loss, over-harvesting due to high demand in urban areas is believed to be the main driver of medicinal plant depletion (Williams *et al.*, 2007). Indeed, over-harvesting was also mentioned as a rationale for the scarcity of some medicinal plants in the Cape Peninsula. However, realising the scarcity of some medicinal plants and weighing the importance of medicinal plants for primary healthcare, cultural preservation and income generation, the majority of stakeholders responded positively to some alternatives proposed to overturn the ongoing dwindling of medicinal plants.

6. 3. 1. *In-situ* conservation of medicinal plants

Although both *in-situ* and *ex-situ* management of a particular species is important and relevant in their respective contexts, these two management types serve different purposes. *In-situ* conservation contributes to the long term survival and evolution of a species, while *ex-situ* management such as cultivation, mainly stands to meet the production requirement for consumption (Srinivasamurthy and Ghate, 2002). Despite the fact that cultivation may reduce pressure on wild populations, cultivated species, due to limited genetic variability, can still go

extinct at stochastic events such as pests and diseases. Therefore, the only best way to maintain the intra-specific variation within the species is via an *in-situ* conservation strategy.

This survey has reported species that are threatened at some point: critically endangered, vulnerable, rare and declining. These species are of concern and in need of urgent conservation and management attention. Therefore, commercial harvesting of these species from the wild populations, either on protected state or privately owned lands should be prohibited. As it may be difficult to catch an offender in the act of collecting protected species, possession of these species should be prohibited as suggested by the 1993 WHO/IUCN/WWF Guidelines on the Conservation of Medicinal Plants and the International Standard for Sustainable Wild Collection of Medicinal and Aromatic Plants (ISSC-MAP) (Medicinal Plant Specialist Group, 2007). As the majority of respondents mentioned the existence of substitutes for most traded/used species, including those of concern, the usage of substitutes should be encouraged as an alternative to this ban. This is, of course, dependent on the fact that the substitutes are not threatened. For domestic usage, in the absence of baseline information on sustainable harvesting levels, rotational harvesting as it is practiced now, but under the supervision of conservationists, should continue. However, this collection should be carried out in areas clearly defined, with its boundaries established and by pre-identified group of harvesters. This is to avoid collection inside core zones, where species are protected or undergoing assessment. When baseline information on targeted species is available, harvesting should follow the 2007 ISSC-MAP guidelines. For example, harvested quantities should be defined on the basis of volume, weight or number of plants of targeted species. In addition, protected area managers should determine harvesting periods based on seasonality, precipitation cycles and flowering period.

Like other parts of South Africa, in the Cape Peninsula, many species of medicinal plants are traded/used for their vital parts, which include roots, bulbs, rhizomes, corms and bark. Environmental organisations in the study area and even in the Eastern Cape, from where most of the tree species are harvested, should sensitise resource users to the detrimental impact of harvesting these parts. They should encourage them to substitute these vital parts with leaves. In fact, active chemical compounds in plants are produced in the leaves and are stores in other plant parts, including bark and underground parts. Chemical compounds comparison studies tend to support the possible substitution of these destructive parts with leaves (Geldenhuys, 2004; Zschocke *et al*., 2000). The low concentration of active ingredient in leaves, which traditional

health practitioners stated "lack healing power", could be overcome by increasing the quantities of used leaf materials. For example, it was found that the leaves of *Pelargonium sidoides* may substitute for its roots in medicinal formulations (Lewu *et al*., 2006). Similarly, the leaves of *Octea bullata*, which bark are sold/used in the study area, may substitute for its bark (Geldenhuys, 2004). Thus, a shift toward the usage of aerial parts, including leaves and twigs, if accepted by resource users, especially traditional healers, may result in sustainable harvesting of even protected species of medicinal plants.

6. 3. 2. *Ex-situ* preservation of medicinal plants

It has been speculated that the best way of supplying the increasing demand for medicinal plants is by bringing these resources into cultivation (WHO/IUCN/WWF, 1993). Apart from relieving pressure on wild populations, cultivated species often present some pharmacological advantages over wild collection. Variations observed in composition and concentration of active compounds in wild species, mainly due to environmental and genetic differences, may significantly be reduced under cultivation as species are grown in areas of similar climate and soil and harvested at the right time.

As the majority of respondents showed their willingness to cultivation and purchase cultivated medicinal plant species, cultivation would be one of the long term responses to wild collection of medicinal plants in the Cape Peninsula. With the involvement of resource users, small-scale cultivation of species under threat could be prioritised. Municipalities in the Cape Peninsula should provide stakeholders with portions of land in areas that are already designated or are being used for agriculture as land was the main impediment for undertaking cultivation. Seedlings of some native medicinal plant species could be obtained from medicinal plant nurseries such as 'Van Den Berg Garden Village', and the Kirstenbosch National Botanical Garden. For informants currently involved in home gardens such as those in Grabouw, seedlings of slow growing species could be freely provided to them. Apart from the propagation of plants and education, local municipalities and conservation organizations could also focus on practical skills development such as plant propagation and basic gardening techniques. This was successfully implemented by SANParks and Rastafarians communities in Knysna for *Bulbine latifolia* (Rooiwortel), which was the most valued species among the Rastafarians in the current study (Vermeulen, 2005).

In addition, species such as Buchu which is currently under small-scale cultivation should not only supply processing international and national industries but also made available to informal market in their raw forms to meet the growing demands for medicinal plants.

On the other hand, as agriculture is pointed out as the main driver of biodiversity loss in the Cape Peninsula, farmers should be encouraged to shift from monoculture to intercropping systems. This would consist of inter-planting some economically valuable short cycle medicinal plants with food crops. This system is successfully being practiced in India (Rao *et al*., 2004). The CapeNature could also persuade private landowners to allow medicinal plant gatherers to collect some valuable species from their farmlands before burning their lands as requested by the Rastafarian informants.

Finally, intercultural health knowledge exchanges between traditional health practitioners and western health practitioners should be established. This kind of cooperation, which has proven to be effective in some parts of the world (Mignone *et al*., 2007), could result in the wise use of medicinal plants by traditional health practitioners. On the whole, despite the cost of some recommendations, these measures could contribute to conserve medicinal plants and at the same time improve the livelihoods of local people in the Cape Peninsula.

6. 4. Areas for future research

As the questionnaire was formulated to capture only species of medicinal plants actively traded/used, it is obvious that the total number of species in use/trade in the Cape Peninsula other than those for medicinal purposes exceeds the current estimate reported in this investigation. Indeed, the respondents were asked to mention the 10 most traded/used species. Therefore, future surveys should focus on the whole range of species in trade/use. The teams carrying out the surveys should preferably be multi-disciplinary. These teams may be comprised of conservation campaigners (to persuade the public of the need to conserve medicinal plants), resource economists (to evaluate the patterns of use and the economic values of medicinal plants), taxonomists (to identify medicinal plants accurately) and resources users (to provide information on the uses and availability of medicinal plants). Particular focus should be on species believed to have become scare or are dwindling in the wild.

Having shown their willingness to use cultivated medicinal plant species, future surveys could be on based on determining the number of cultivated species including the 10 most used or traded species identified by this study.

As baseline information on target species is not available for the bulk of species in use in the study area, future studies may investigate target species' population size, distribution, structure (age and size class), impact of harvesting (e.g. regeneration after harvest), time and frequency of harvesting as well as quantifying collectable yield. This information would contribute to the sustainable harvesting of wild population of medicinal plants. Importantly, the outcomes from these recommended studies should be explained and disseminated to resource users.

6. 5. Limitations of the study

The main limitation of the study was the initial lack of trust the surveyed communities and informants had toward the researcher. This situation was mainly due to the attitude of previous researchers. In fact, some researchers who recorded pharmacological usages of medicinal plants in the Cape Peninsula did not give any feedback to the informants from whom they derived information. More frustrating is the fact that some books were published, but no samples of these books were given to them. The other reason justifying this initial reluctance of the informants to participate in the study was the relationship between the CapeNature and local communities. Some Rastafarian informants do not support the current monthly rotational harvesting of natural resources in protected areas as they believe that this management strategy does not take into account their socio-economic conditions. This lack of support has resulted in illegal activities in protected areas. It might be appropriate to review this management strategy with the involvement of all stakeholders. However, this initial lack of trust was overcome by involving some members of the concerned communities in the research team. Inclusion of some of their problems and challenges in the final questionnaire and continuous supply of relevant information to participants created the necessary understanding and environment for effective interaction. Apart from the final report that they will be receiving at the completion of the study, the outcome of the study will also be explained to them.

Acquiring vouchers for species sold for their bark and that originate from the Eastern Cape Province was the other challenge. This resulted in the lack of identification for some

species. Therefore, further studies should not only benefit from consistent findings, but also benefit from the collaboration of conservation agencies, harvesters and traditional health practitioners from the Eastern Cape Province.

6. 6. References

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Appendix A: List of species most traded/used in the Cape Peninsula

Scientific name	Species common name (s)	Family	Life form	Part used
Acacia caffra	umthole	Fabaceae	Tree	Bark
Acacia mearnsii	Black watlle	Fabaceae	Tree	Bark
Acacia xanthophloea	umkhanya-kude	Fabaceae	Tree	Bark
Acokanthera oppositifolia	Slang blaar	Apocynaceae	Tree/shrub	Leaf
Agathosma betulina	Buchu; Bergboegoe	Rutaceae	Shrub	Leaf & stem
Agathosma collina	Senuwee tee; berg tee	Rutaceae	Shrub	Leaf & stem
Agathosma crenulata	Buchu; Anysboegoe	Rutaceae	Shrub	Leaf & stem
Agathosma spp.	Coffee buchu	Rutaceae	Shrub	Leaf & stem
Albuca setosa	inqwebeba; white onion	Hyacinthaceae	Geophyte	Bulb
Alepidea amatymbica	Kalmoes; iqwili	Apiaceae	Herb	Rhizome
Alepidea delicatula	Kalmoes; iqwili	Apiaceae	Herb	Root
Aloe ferox	Intelezi; ikhala; aloe	Asphodelaceae	Succulent	Whole; leaf
Aloe perfoliata	Intelezi; ikhala; aloe	Asphodelaceae	Succulent	Whole; leaf
Aloe plicatelis	Banana aloe	Asphodelaceae	Shrub or small tree	Whole; leaf
Aloe rupestris	Intelezi; ikhala; aloe	Asphodelaceae	Succulent	Whole; leaf
Amaryllis belladonna	Elephant feet	Amaryllidaceae	Geophyte	Bulb
Anthospermum spp.? Aspalathus spp.?	Renosterbos(sie)		Shrub	Leaf & stem
Apodolirion buchananii	icukudwana	Amaryllidaceae	Geophyte	Bulb
Arctopus echinatus	Kaapse platdoring	Apiaceae	Herb	Root
Aristea africana	Moerbos	Iridaceae	Herb	Whole
Artemisia afra	Wilde als; uMhlonyana; wormwood	Asteraceae	Herb	Whole
Asparagus spp?	ingcelwane	Asparagaceae		Root
Behnia reticulata	isilawu	Behniaceae	Climber	Root
Bersama lucens	isindiyandiya	Melianthaceae	Tree	Root
Bowiea volubilis	umagaqana	Hyacinthaceae	Geophyte	Bulb
Brunsvigia marginata	Gifbol	Amaryllidaceae	Geophyte	Bulb
Buddleja salviifolia	Bloublomsalie; Salie	Scrophulariaceae	Tall shrub	Leaf & stem
Bulbine alooides	Red storm	Asphodelaceae	Geophyte	Tuber
Bulbine latifolia	Rooiwortel; red carrot	Asphodelaceae	Geophyte	Rhizome

Cadaba aphylla	Swartstorm; black storm	Brassicaceae	Tree/shrub	Root
Chironia baccifera	Bitterbos	Gentianaceae	Dwarf shrub/ herb	Leaf & stem
Cinnamomum camphora	uroselina	Lauraceae	Tree	Bark; leaf
Cissampelos capensis	David root; Dawidjiewortel; Mayisake	Minispermaceae	Climber	Root
Cliffortia grandifolia	unknown	Rosaceae	Shrub	Leaf & stem
Cliffortia odorata	Wildewingerd	Rosaceae	Shrub	Leaf
Clivia nobilis	uMayime	Amaryllidaceae	Geophyte	Bulb
Clivia miniata	uMayime	Amaryllidaceae	Geophyte	Bulb
Cnicus benedictus	Karmadik	Asteraceae	Herb	Whole
Cotyledon orbiculata	iPewula; iPhewula; Elephant's ear	Crassulaceae	Succulent	Leaf
Croton gratissimus	umahlabekufeni	Euphorbiaceae	Tree	Root; leaf
Croton sylvaticus	(u)Gibeleweni	Euphorbiaceae	Tree	Root
Curtisia dentata	uMlahleni; mlhaleni	Cornaceae	Tree	Root; bark
Cussonia spicata	(u)Msenge	Araliaceae	Tree	Root; bark
Cyrtanthus mackenii	(u)Velabahleke	Amaryllidaceae	Geophyte	Bulb
Dicoma capensis	Koorsbos(sie); wilde karmadik	Asteraceae	Herb	Leaf & stem
Dioscorea sylvatica	Skilpad; uFudu; isiKolipati	Dioscoreaceae	Herb	Tuber
Dodonaea angustifolia	Ysterhoutoppe	Sapindaceae	Tree/shrub	Leaf & stem
Drimia elata	umredeni	Hyacinthaceae	Geophyte	Bulb
Drimia spp.	Red onion	Hyacinthaceae	Geophyte	Bulb
Elaeodendron transvaalensis	inGwavuma	Celastraceae	Tree	Bark
Elytropappus rhinocerotis	Renosterbos(sie)	Asteraceae	Shrub	Leaf & stem
Eriocephalus africanus	Koorskuid	Asteraceae	Shrub	Leaf & stem
Eriospermum lanceolatum	Kaneelbol; kaneeltjies	Eriospermaceae	Geophyte	Tuber
Eucalyptus spp.	Bloekom	Myrsinaceae	Tree	Leaf
Felicia aethiopica	umThiwezulu	Asteraceae	Shrub	Leaf & stem
Gasteria bicolor	Intelezi; iKhala; aloe; iMpundu	Asphodelaceae	Succulent	Whole
Gasteria croucheri	Intelezi; iKhala; aloe; iMpundu	Asphodelaceae	Succulent	Whole
Gerrardina foliosa	Maluleko	Flacourtiaceae	Tree	Root
Gnidia kraussiana var. kraussiana	uMsilawengwe	Thymelaeaceae	Shrub	Root
Gunnera perpensa	iPhuzi	Gunneraceae	Herb	Root
Haemanthus albiflos	(u)Mathunga	Amaryllidaceae	Geophyte	Bulb

Haemanthus sanguineus	(u)Mathunga	Amaryllidaceae	Geophyte	Bulb
Haworthia attenuata	Intelezi; iKhala; aloe; iMpundu	Asphodelaceae	Succulent	Whole
Helichrysum spp. (H. petiolare)	Kooigoed; hotnots-kooigoed; impepho	Asteraceae	Herb	Leaf & stem
Helichrisum spp.	Tiemie	Asteraceae	Herb	Leaf & stem
Helinus integrifolius	(u)Bhubhubhu	Rhamnaceae	Climber	Root
Heteromorpha arborescens	Wildepietersielie; parsley	Apiaceae	Shrub/small tree	Leaf
Hibiscus pusillus?	uvuma			Root
Polygala galpinii?	uvuma			Root
Hippobromus pauciflorus	Perdepis; uLathile	Sapindaceae	Shrub	Leaf & stem
Hypoxis hemerocallidea	African potato; iNongwe; iLabatheka	Hypoxidaceae	Geophyte	Corm
Ilex mitis	isidumo; isidumu	Aquifoliaceae	Tree	Bark
Kniphofia uvaria	ixonya	Asphodelaceae	Herb	Root
Knowltonia bracteata	umvuthuza	Rununculaceae	Herb	Whole
Lavandula angustifolia	Lavender	Lamiaceae	Shrub	Leaf & stem
Lederouria spp.	isithithibala	Hyacinthaceae	Geophyte	Bulb
Leonotis leonurus	Wilde dagga; klipdagga	Lamiaceae	Shrub	Leaf & stem
Lobostemon fruticosus	Ag-dae-genees-bos	Boraginaceae	Shrub	Leaf & stem
Melianthus major	Kruidjie-roer-my-nie	Melianthaceae	Shrub	Leaf
Mentha longifolia	Kruisement	Lamiaceae	Herb	Leaf & stem
Nidorella spp.?	umhlabelo			Root
Selago spp.?	umhlabelo			Root
Ocotea bullata	umnukane; uNukani	Lauraceae	Tree	Bark
Olea europaea. Subsp. africana	umquma	Oleaceae	Tree	Leaf
Osmitopsis asteriscoides	Bels	Asteraceae	Shrub	Leaf & stem
Pachycarpus concolor	itshongwe	Apocynaceae	Geophyte	Root
Parmelia spp.	Klipblom	Parmeliaceae	Lichen	
Pelargonium graveolens	Malvablare; rooi malva	Geraniaceae	Herb	Leaf & stem
Pelargonium triste	Kaneelbol; kaneeltjies	Geraniaceae	Geophyte	Tuber
Pentanisia prunelloides	icimamlilo	Rubiaceae	Herb	Root
Peucedanum galbanum	Bergselery; wild selery	Apiaceae	Shrub	Leaf & stem
Pittorporum viridiflorum	umkhwenkwe	Pittosporaceae	Tree	Bark
Polygala serpentaria	inceba	Polygalaceae	Herb	Root

Ptaeroxylon obliquum	umthathi	Rutaceae	Tree	Bark
Rafnia amplexicaulis	Soethout wortel; sweet root	Fabaceae	Shrub	Root
Rapanea melanophloes	uMaphipha	Myricaceae	Tree	Bark
Rauvolfia caffra	umjelo; ujelo	Apocynaceae	Tree	Bark
Rhoicissus tridentata	(u)Chithibhunga	Vitaceae	Climber	Tuber
Rhoicissus tomentosa	iMpinda bamshaye	Vitaceae	Climber	Tuber
Rosmarinus officinalis	Roosmary	Lamiaceae	Shrub	Leaf
Rumex sp	idolo lenkonyana	Polygonaceae	Herb	Root
Ruta graveolens	Wynruit; vue	Rutaceae	Herb/ shrub	Leaf & stem
Salix mucronata	Rivierwilger; river willow;wild willow	Salicaceae	Shrub/ small tree	Branch tips
Salvia africana-caerulea	Bloublomsalie; Salie	Lamiaceae	Shrub	Leaf & stem
Salvia spp.	isicakathi	Lamiaceae	Herb	Root
Sanseviera aethiopica	Bitter patat	Dracaenaceae	Geophyte	Tuber
Sarcophyte sanguinea subsp. Sanguinea	umafumbuka	Balanophoraceae	herb	Bulb
Schotia spp.	umgxam	Fabaceae	Tree	Bark; leaf
Senna spp.	isiNyembane	Fabaceae	Tree; shrub	Leaf
Siphonochilus aethiopicus	Wild ginger; isiphepheto	Zingiberaceae	Herb	Rhizome
Solanum spp.	umthuma	Solanaceae	Shrub	Root; fruit
Spirostachys africana	umthombothi	Euphorbiaceae	Tree	Bark
Stachys aethiopica	Katterkruie	Lamiaceae	Herb	Leaf
Stangeria eriopus	imifingwane	Cupressaceae	Herb	Root
Stoebe cinerea	Slang bos(sie)	Asteraceae	Shrub	Leaf & stem
Strychnos spp.	umnonono; umnono	Strychnaceae	Tree	Bark
Sutherlandia frutescens	Cancer bush; Kanker bossie; keurkie	Fabaceae	Dwarf shrub	Leaf & stem
Tabernaemontana ventricosa	umkhamamasane	Apocynaceae	Tree	Root
Tetradenia riparia	iboza	Lamiaceae	Tree	Leaf
Thesium lineatum	Witstorm; White storm	Santalaceae	Shrub/parasite	Root
Trichilia spp.	umkhuhlwa	Meliaceae	Tree	Root; bark
Tulbaghia alliacea	umwelela; Isivimbampunzi	Alliaceae	Geophyte	Bulb
Tulbaghia violacea	Wild garlic	Alliaceae	Geophyte	Bulb
Vernonia oligacephala	Groenamara	Apiaceae	Herb	Leaf
Viscum capense	Voelent	Viscaceae	Shrub/parasite	Stem

Warburgia salutaris	isibharha; isibhaha	Canellaceae	Tree	Bark
Xysmalobium spp.	itshongwe	Apocynaceae	Geophyte	Root
Zantedeschia aethiopica	Varkblom(blaar)	Araceae	Geophyte	Leaf
Zanthoxylum capense?	umlungumabele			Bark
Ziziphus mucronata	umphafa	Rhamnaceae	Tree	Root
Zornia capensis	umkhondo	Fabaceae	Herb	Stem
unidentified	Bheka mina ngedwa			Root
unidentified	gobho-uthangazane			Root
unidentified	ikhawu			Leaf
unidentified	imbontjie			Root
unidentified	imitsha			Root
unidentified	impendulo			Fruit
unidentified	indalothi			Root
unidentified	indlebe yebokhwe			Root
unidentified	indonya			Rhizome
unidentified	ingcabuzobobo			Root
unidentified	ingwe			Bark
unidentified	intelezi eluhlaza			Whole
unidentified	intelezi emhlophe			Whole
unidentified	intelezi emhlophe			Whole
unidentified	intelezi ezikhulu			Whole
unidentified	iphakama			Whole
unidentified	ipotoli			Fruit
unidentified	ishwati			Root
unidentified	lyeza lamasi			Root
unidentified	mlomo-mnandi			Root
unidentified	mpila			Root
unidentified	ndlavuza			Bark
unidentified	nkuphulane			Root
unidentified	umnga			Bark
unidentified	umvusanduku			Bark
unidentified	ungcana			Root

unidentified	uvukwabafile		Root; bark
unidentified	zankolana		Bulb
unidentified	Basil mint		Leaf
unidentified	Brandnetel		Leaf & stem
unidentified	Granaatskille		Leaf
unidentified	Kamille		Leaf
unidentified	Kanfer bossie		Leaf
unidentified	Love root	Shrub	Root
unidentified	Slanghoutjie/snake root		Root
unidentified	Turksvyblaar		Flower
unidentified	Vark wortel		Tuber
unidentified	ibangalala		Leaf
unidentified	umathithibala		

Appendix B: Market survey questionnaire

1. General information

Location: ……………………………………………………………………………………..

Date: …………………………………………………………...……………………….

Interviewee: ……………………………..………………………………………………..

Home Language: ………………………………………...………………………………..

Informant formal occupation: ………………………………………………………………..

Gender: [M]   [F]

 Race: [African]   [White]   [Coloured]

Age group: [10-20] [21-30] [31-40] [41-50] [51+]

Educational level attained: [No Schooling]   [Primary]   [Secondary]   [Tertiary]

Province of origin: ……………………………………………………………………...

Number of dependent (Person in charge): …………………………………………………...

Involvement category: (**1**) **Trader**   (**2**) **Healer**   (**3**) **Collector**

Why did you involve in medicinal plants**?** ....
…………………………………………………………………………………………..

Is it a full or part-time activity? …………………………………………………………...

How long have you been healing people /selling plants……………………………………..

2. Dynamics in the demand for medicinal plants

a   What season do you have more customers/patients? If any trend, please explain why?..
....

b   Have the sales of medicinal plants/number of patients changed compared to the past? [Decrease] [Increase] [Stable] [Don't know]

c   How do you describe the demand for medicinal plants in the future? [Decrease] [Increase] [Stable] [Don't know].
Please justify your view: ……………………………………………………………...

d   Where do most of your customers/patients come from ……………………......................

3. Distribution and the availability of the natural plants used for medicinal purpose

a   Means of supply: [grow]   [buy]   [collect from wild]? If you collect from the wild, please mention where? ....

b   Are these plants easy to find?   [Yes]   [No]

    If "No", explain why? …………………………………………………….......... ....

c   Have you noticed a change in terms of the availability of medicinal plants? [Yes]   [No]

    Please justify your answer: …………………………………………….......................

d   Can any other plant(s) be substituted when the above plants are not available? [Yes] [No]

    Please mention some of them: …………………………………………….....................

e   How often do you harvest these plants? ....

f   Do non-members from your community people collect medicinal plants where you harvest? [Yes] [No]

    If yes, where might they come from? …………………………………………………...

4. Conservation status of the used plants and alternatives to alleviate pressure on most popular species

a   Are you aware of the depletion of some medicinal plant species in the wild? [Yes] [No]

    If "yes", what do you think are the causes? ....

b   What would you do if some medicinal plant species can no longer be found in the wild? ....

c   If medicinal plant can be grown by local farmers, would you buy them? [Yes] [No]

    Could you justify your position: ……………………………………….............................

d   If seeds of mentioned medicinal plant species could be freely supplied, would you grow them? [Yes] [No]

    Please justify your answer: …………………………………………………...

e   Do you know if the plants you have been using are protected? [Yes] [No]

    If yes, how did you get informed? …………………………………………………

f   What problems and challenges do you experience in practicing your medicinal plants related-activity? …………………………………………………………………………

g Do you make a living out of the trade of medicinal plants?   [Yes]   [No]

If yes, which category would describe your monthly income?

[<R500] [R501-R1000] [R1001-R1500] [R1501-R2000] [R2001-R2500] [R2501-R3000]

[>R3001]

5. Stakeholder 10 most traded/used species of medicinal plants

No	Plant name (s)	Part (s) used	Source of supply	Price/unit
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				