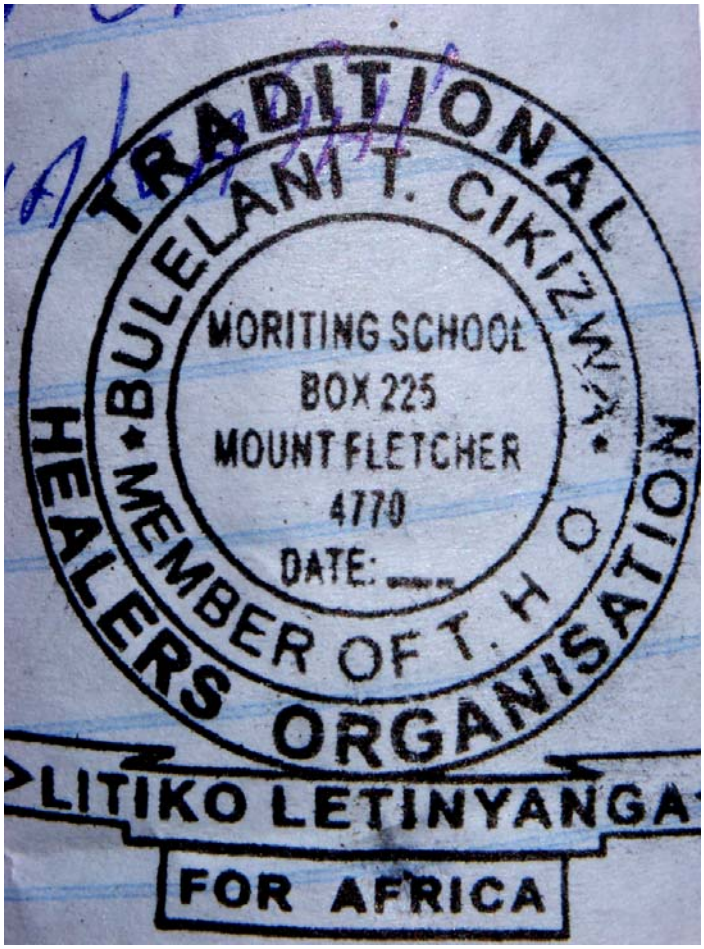
Medicinal plants, its Condition and Socio Economic Impacts - a Case Study in Makomereng and Pepela, South Africa

Interdisciplinary Land Use and Natural Resource Management



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Faculty of Life Sciences

A team effort needs a team slogan…

“Why Not!?”

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Abstract

This paper examines the situation of medicinal plant distribution, exploitation, management, its economical, health and cultural impacts on people's livelihood. It was conducted from 2nd March to 12th March 2008.

The study shows that around 55 species of medicinal plants are mentioned and used in the research area. *Alepidea amatymbica, Helichysum spp., Artemisia afra, Xysmalobium undulatum, Gasteria spp*. *Haworthia spp &Aloe spp*, are respectively the most frequently used species. *Alepidea amatymbica* is the most frequently mentioned scarce species. 13 species of medicinal plants are found cultivated but only for household consumption. But most people still believe in wild medicinal plants.

The villagers do not have any income from medicinal plants except the healers and hawkers that generate a small income from medicinal plant products. 95 of households surveyed are using traditional medicines. The local community believes that medicinal plants have spiritual powers which provide it with important cultural value.

The exploitation of medicinal plants can be segmented into three different periods. From 1968 to 2002, it was small scale commercial gathering and no management rules were applied. From 2002 to 2004, the commercial gathering was large scale with no management rules. Since 2004 onward, there has been a ban on commercial gathering and the management rules have been introduced. According to the perception of local community, the medicinal plant availability seems to increase since 2004. The rules are not enforced by law, but it is being effectively applied because there is an involvement of the community in defining the rules.

I. Introduction

Medicinal plants have significant roles in the livelihoods of people in South Africa especially for rural community as, firstly, it can provide a source of income, secondly, is important in primary health care delivery system in rural area and, thirdly, it has an important cultural value.

Indigenous medicine is widely used in South Africa. Mander (1997) estimated that around 27 million South Africans use indigenous medicines. It is reported that there are over 400 000 indigenous healing practitioners in South Africa (Mander and Breton, 2005). The volumes sold are very difficult to estimate because of a lack of records and the often illicit nature of trade. However, Mander (2005) estimated that approximately 35 000 to 70 000 tonnes of medicinal plants were consumed in South Africa annually, valued at approximately R 0.549 – 1 billion (≈US$ 75-150 million). The rural poor are major stakeholders in the medicinal plant trade, particularly women and sectors of the community with limited alternative income generating opportunities (Cunningham, 1991; Mander, 1998).

Meanwhile, major concerns have arisen as increasing demand for medicinal plants result in an increased pressure on wild plants as most of the plants traded in South African markets are observed to be harvested from wild population and are not cultivated.

The harvesting of medicinal plants was formerly the domain of trained traditional medical practitioners, well-known for their skills as herbalists and diviners (Cunningham, 1991). Strict customary conservation practices were respected, which regulated plant collection times and quantities. With the advent of urbanization and the consequent commercialization of traditional health care, however, the demand for medicinal plants has increased. As a result, harvesting has become the domain of untrained, and often indifferent, commercial gatherers with no other income sources. Harvesting and the provision of medicinal plants to meet the urban demand have thus become an environmentally destructive activity (Williams *et al.,* 2000). Another view is presented by Brown (1992) that states that the direct local use of plant resources contributes to the preservation of species and habitats, and can be used as the basis for conservation policies centred on indigenous management regimes and utilization.

With the previous statements, we have some assumptions: If the harvesting and the provision of medicinal plants become an environmentally destructive activity, the resource distribution might have changed. As the harvesting used to be a strict customary conservation practice, there would have the reaction of the trained traditional practitioners into the new practices. Assuming that the medicinal plants have significant roles in the livelihood of local people, the local community would have done something against the commercial gathering for the preservation of their resources.

It is the reason why the research study on the topic: "***Medicinal plants, its Condition and Socio Economic Impacts: A Case Study in Makomereng and Pepela, South Africa"*** has been conducted with the following formulated objectives:

1) To investigate the situation of resource distribution and use of medicinal plants in Makomereng and Pepela, South Africa.
2) To investigate the economical, health and cultural impacts of medicinal plants on local people's livelihood.
3) To understand management rules, perceptions on practices and perspectives over the resource utilization.

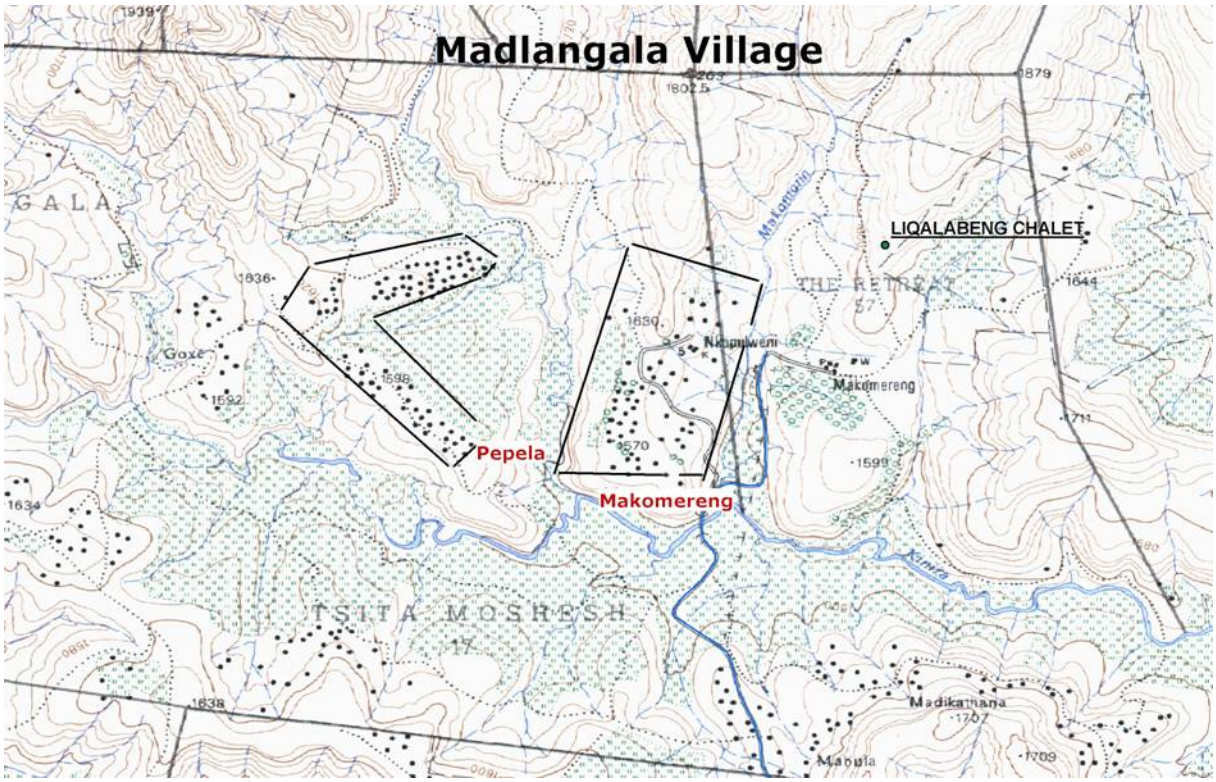
Some main research questions have also been formulated in order to answer to:

1) What is the current status of medicinal plant distribution, and is there any change of the resource distribution?
2) How was/is the medicinal plant resource exploited in the past and now?
3) How are the economical, health and cultural impacts of medicinal plants on local people's livelihood?
4) How are the health situation and the increase in population affecting medicinal plant use?
5) What are management rules, perceptions on practices and perspectives over the resource utilization?
6) What are the other factors affecting medicinal plant stock?

II. Area description

The study was conducted in the villages of Makomereng, Pepela (situated in Madlangala), and Mabua (Tsita). These are located in the Maluti District of the Transkei Region, which is part of the Eastern Cape Province. The study site is located on the foothills of the Drakensberg Mountains, belonging to the grassland biome.

The residents of Makomereng, Pepela and Mabua belong to the Xhosa and Sotho people though people from Makomereng and Pepela speak mostly Xhosa, and the ones from Mabua in general speak Sotho.



Picture 1: Topographic map of research area

III Research methodology

3.1 Methods

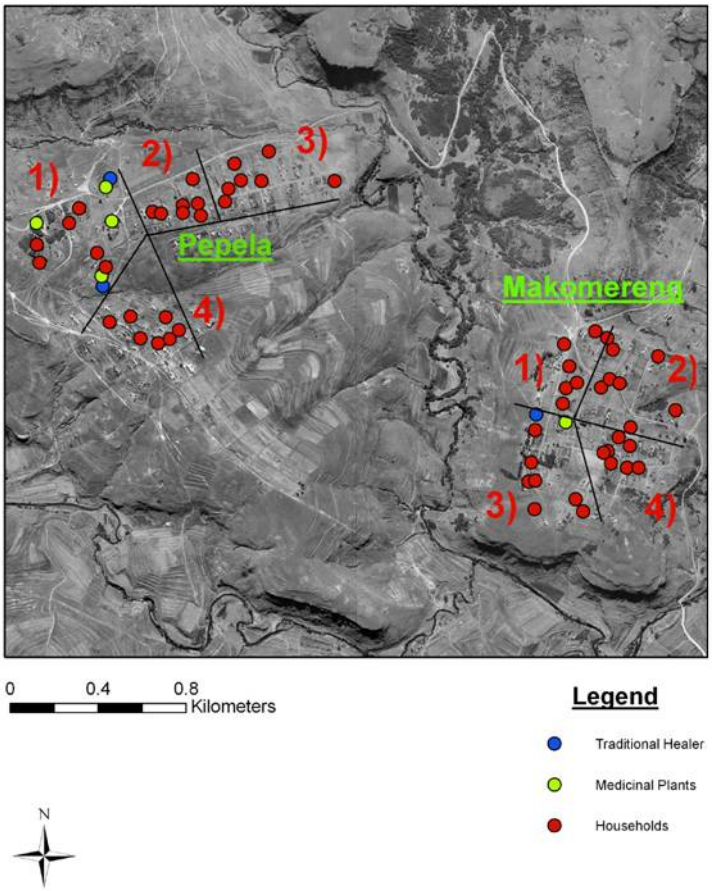
3.1.1 Sampling

Target populations for our research are hawkers, traditional healers, gatherers and villagers. For the questionnaire survey, the sampling size was calculated by using Yamane (1967) formula.

$$n = \frac{N}{1 + N(e)^2}$$

n: Sampling size
N: Population
e: Error of precision

56 households have been chosen with the error of 11%. We have divided the area into 4 sections based on the geographical side (Picture 3) and 7 households in each section have been randomly selected.



Picture 2: Sample distribution

3.1.2 Literature review

Documentary research was used to find information about research area, botanical characteristics of medicinal plant species in the area. Secondary data of quantitative information about the number of HIV/AIDS infected people in the research area has been used.

3.2.1 Survey

3.2.1.1 Questionnaire

Questionnaire is applied with villagers to make generalization on income, impact of medicinal plant use on health, objective for medicinal plants use, perception on wild and cultivated medicinal plant use and status of current domestication and cultivation of medicinal plants. (Appendix 3)

3.2.1.2 Semi-structured and in-depth interview

The semi-structure interviews have been used with healers and hawkers in order to gather some information regarding main local diseases, increased use of species because of health situation, harvesting techniques, management rules, objective for medicinal plant use, perception on wild and cultivated medicinal plant use, status of current domestication and cultivation of medicinal plant and income from medicinal plants and other factors affecting medicinal plants (Appendix 4-8).

3.2.2 Participatory rural appraisal (PRA)

3.2.2.1 Field walks and GPS mapping

To "paint" an image of the biodiversity situation in the research area, we tried to cover an area as big as possible to see and map where and to what extend the medicinal plants are presented. These field walks have been conducted with the help from Inyanga's son in Makomereng and Sangoma in Pepela. During the field walk, points where the healers collected medicinal plants have been marked by GPS.

3.2.2.2 Direct observation

Direct observation was conducted during the whole research process for cross-checking the data acquired. Once we arrived in Durban, direct observation has been carried out in Durban markets to get an idea of the flow and sale of the medicinal plants.

3.2.2.3 Participatory mapping

Two participatory mappings on the medicinal plant distribution have been done. The map covering the area where the people in Makomereng collect medicinal plants has been drawn by Inyanga and his son. Another map covering the area where the people in Pepela collect medicinal plants have been drawn by a group of 4 collectors in Pepela.

3.2.2.4 Trend analysis

The trend analysis has been individually conducted with an Inyanga and two Sangomas to get an overview of the changes in medicinal plant endowments from 1990 to 2007. The same quantity of maize grains was given to them to put in each time period and the number of grains represents the availability of medicinal plants.

3.2.2.5 Matrix raking/scoring

This exercise has been used with a group of collectors in Pepela to identify the most frequently used species and to know their perception on the importance of medicinal plant.

3.2.2.6 Seasonal calendar

This tool has been used to know the seasonal gathering of medicinal plants in general and some selected species. These exercises have been carried out at different times with the help from Inyanga, 2 Sangomas and collectors.

3.2.2.7 Focus group meeting

A focus group meeting has been organized with the management team in order to the management rules, practices, time line of commercial gathering and conflict management.

3.2.3 Plant sampling

3.2.3.1 Plant specimens and identification

Medicinal plant specimens were collected and tagged to identify species during field walks with Inyanga's son and Sangoma. Photos of plants were taken.

Medicinal plants' names were given in the local languages; some plants have more than one local name. Identification to get the botanical names was done through comparing plant materials, photographs and local names with reference book (Wyk *et al.*, 1997; Pooley, 2005), dictionary of popularly traded plants in South Africa (Diederichs, 2002) and technician from Herbarium Museum at KwaZulu-Natal University as well as crosscheck with online material. Some plants are spelled differently from reference book and dictionary, so some medicinal plants were identified with help from interpreters.

3.2.3.2 Temporary sampling plot

The temporary sampling plots have been applied in the area where Sangoma gathered the medicinal plants in order to estimate the percentage of density of the medicinal plants.

3.2.4 Data analysis

Data from questionnaire survey is put into excel spreadsheet for the analysis. 55 households are included in the analysis as one questionnaire was lost when photocopying in Pietermaritzburg.

IV Results and findings

4.1 Current status of medicinal plants

4.1.1 Resource distribution

(Responsible Author: Proyuth LY)

During the field walk with Inyanga's son in Makomereng and Sangoma in Pepela to the area where they collect medicinal plants, we found out that medicinal plants are widely distributed in the research area. Medicinal plants are mainly populated in the mountains which are about 2km from the villages up to the point where they can find medicinal plants (fig. 1). Some species can be found in the villages. The abundance of the resource distribution varies from area to area according to each species. According to our observation, *Helichrysum* spp. is likely the most abundant species and it also explained by participatory mapping that its distribution is widely spread in all of the mountains (fig. 1 & 2). It is hard to find *Alepidea amatymbica* in Nabbaephakathi mountain which is considered as the mountain in Makomereng, and they have to go to collect in other mountains which are far away from the village (Ntabaemfitshane or Mandiomo) (fig. 1).

Figure 2 explains medicinal plant distribution in Pepela. Villagers in Pepela usually gather medicinal plants in the (-) different mountains than people in Makomereng (do). They have similar perception of *Alepidea amatymbica* distribution in Mandiomo mountain.

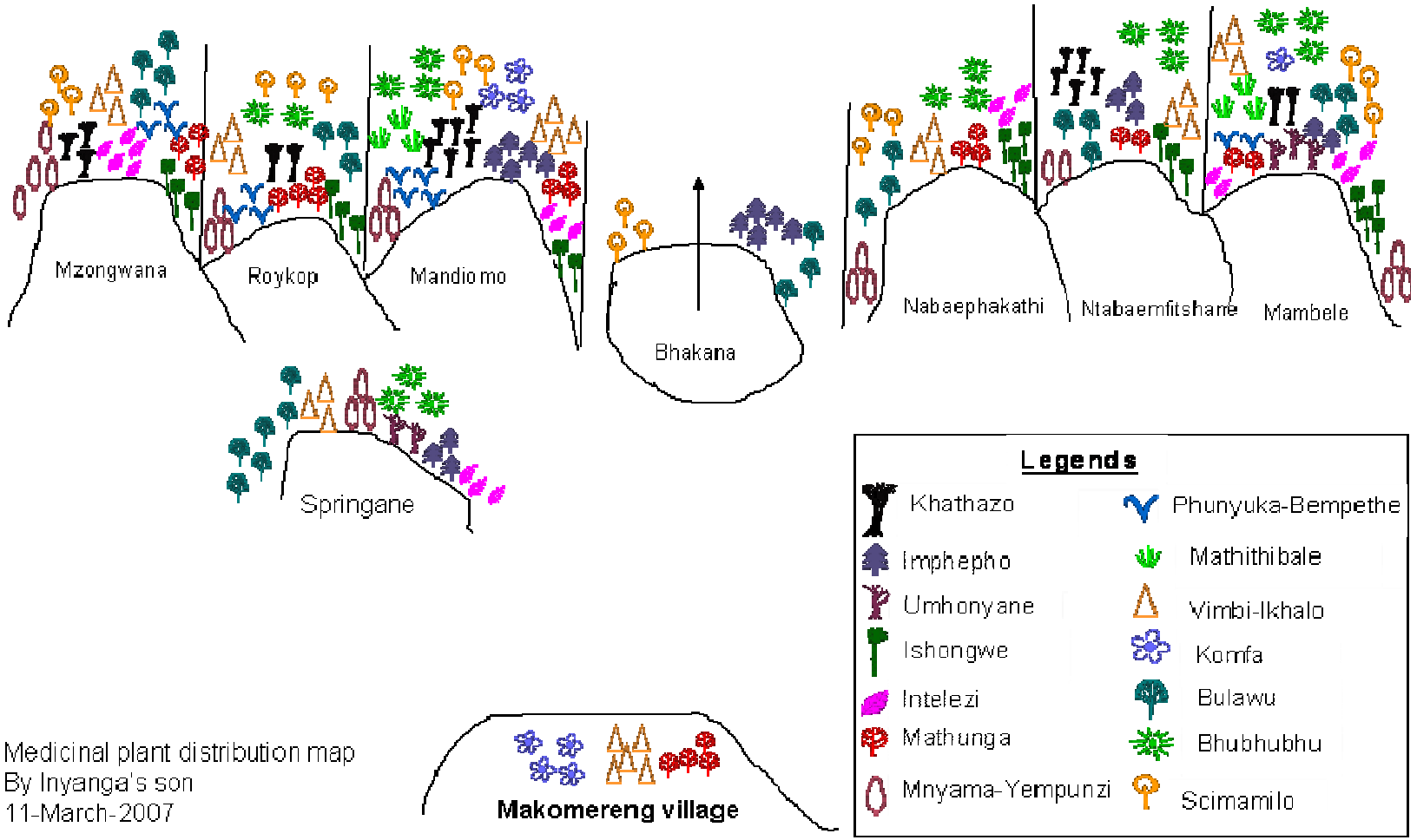


Figure 1: Medicinal plant distribution map in Makomereng

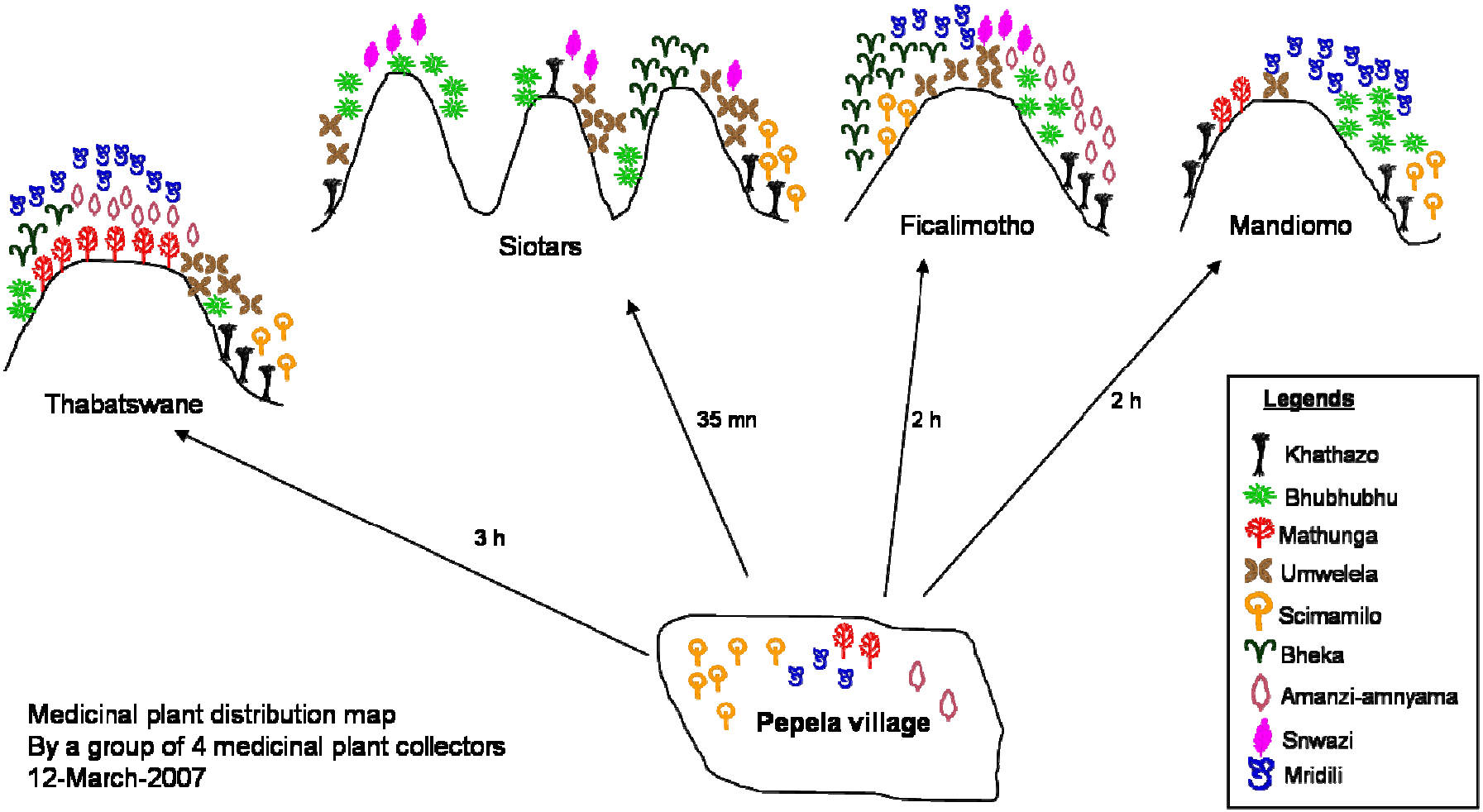
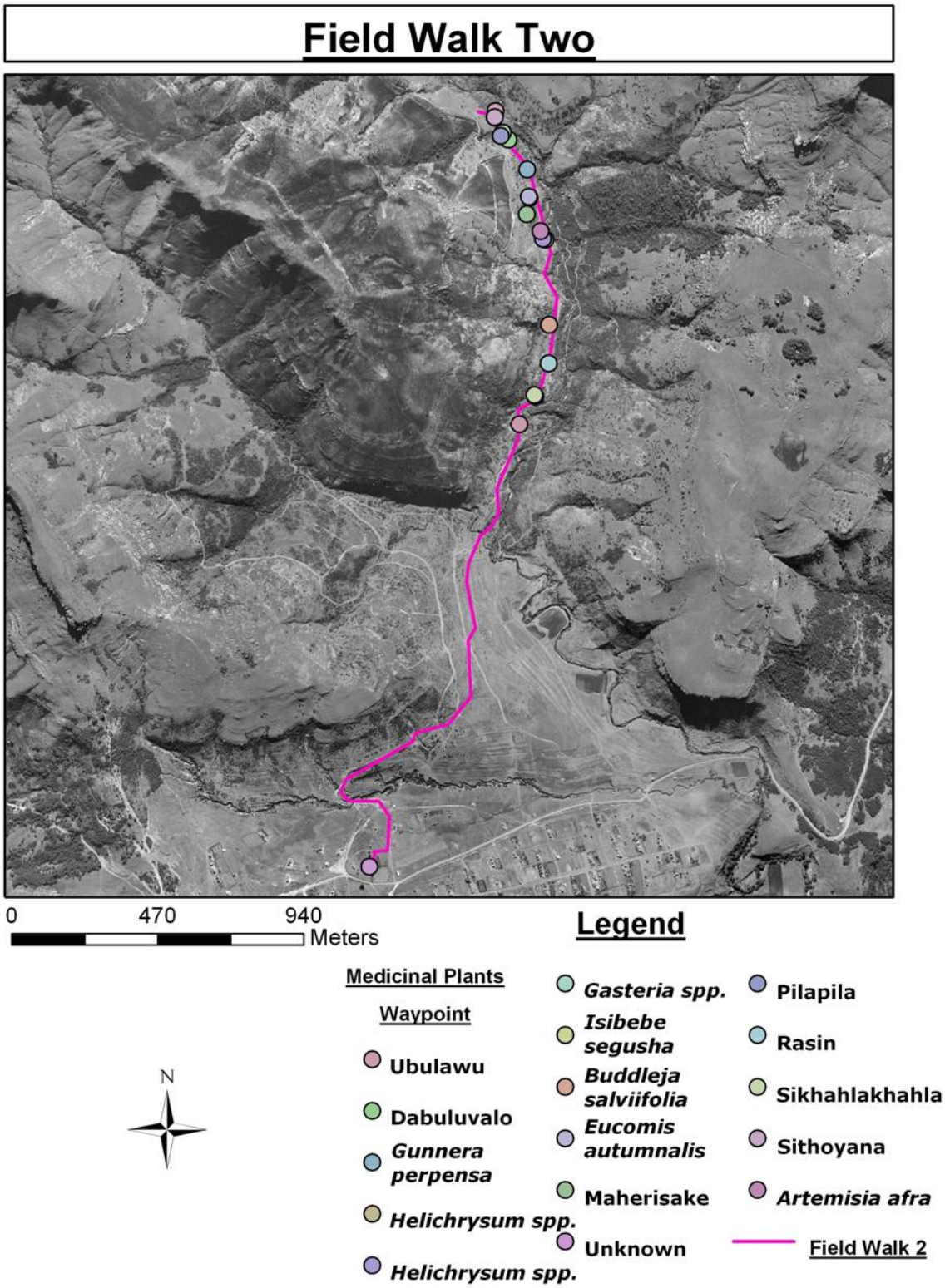
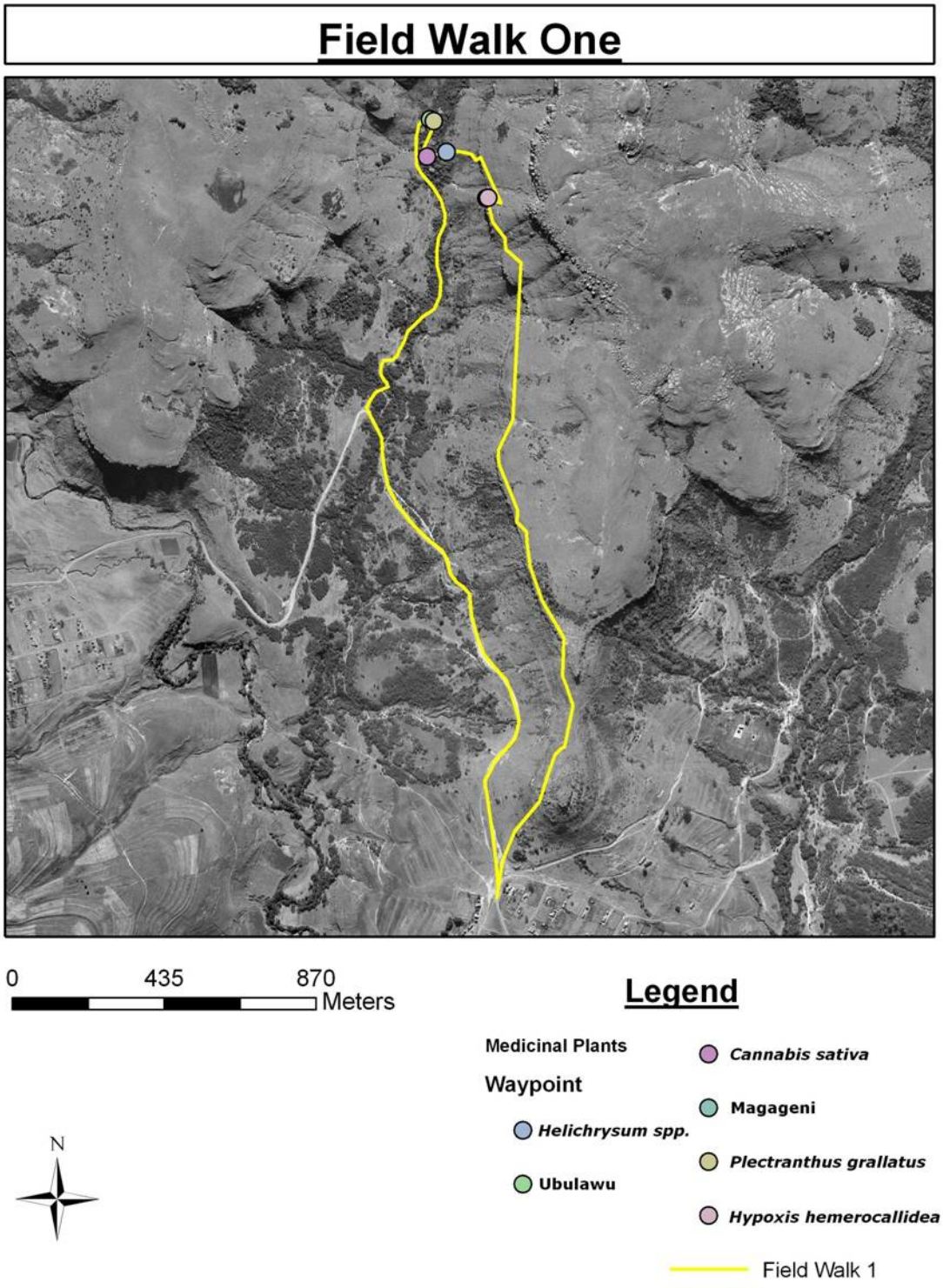


Figure 2: Medicinal plant distribution map in Pepela



Picture 3: Resource distribution from field walk in Pepela



Picture 4: Resource distribution from field walk in Makomereng

4.1.2 Medicinal plant species

(Responsible author: Parichart Promchote)

4.1.2.1 List of species

68 species of medicinal plants were mentioned in the study area. Only 41 species could be botanically identified (Table1). We could not make botanical identification of the other 27 species because plant samples were not available, thus those species remain in the local names as Zulu, Xhosa and Sotho (Appendix 1).

The families with the frequently found species are Asphodelaceae and Asterceae. Habitats and distribution for these species are grassland, rocky areas on hills and mountainsides (Pooley, 2005). 29 of 41 identified species are indigenous to South Africa, 6 species are indicated as alien invasive plants (Table1). Other 6 species were not specified origin region.

Approximately 3,000 species of plants in South Africa are used as medicines and some 350 species are the most commonly used and traded (Wyk *et al*, 1997). More than 160 species of medicinal plants were harvested for trade in Eastern Cape Province and most plant material were harvested from grassland biome that cover 32.4% of the province's area.(Dold and Cocks, 2002). During our research we only found 68 species because people may forget plant names and mention only frequently used or known species. Moreover, the collecting of plant samples was limited by accessibility, guiders and availability of species during the study period. Therefore, to some extent the number of species we found may not reflect the actual natural diversity of medicinal plants in Makomereng and Pepela.

Table 1Medicinal plants mentioned in the study area

No.	Botanical name		Common name (English)	Local name [1]	Part use	Propose of use in the research area	Information on use from literatures	Plant availability and harvesting	Conservation status
	Family	Species							
1.	Adiantaceae	*Cheilanthes hirta* [c]	parsley fern	inkomakoma (Z/X) sikhahlakhahla (R)	leaves, rhizomes	Used for de worming	The leaves are smoked for head colds, chest colds and asthma. Decoctions of rhizomes are traditionally used to treat boils and abscesses, and for intestinal parasites [2]	collect whole plant, available all seasons and easy to find	
2.	Alliaceae	*Tulbaghia violacea* [a]	wild garlic	umwelela, isihaqa (Z, X) Wilde knoffel (A)	bulbs, leaves	No data record	Used for fever and colds, asthma and tuberculosis. Decoctions are administered as enemas for stomach problems [2]	collect whole plant, available on summer and easy to find	
3.	Amaryllidaceae	*Boophane disticha* [a]	bushman poison bulb	incotho (Z) incwadi (X) leshoma (S) gifbol (A)	bulb scales	Used to treat mental problem	Outer scales are used as an outer dressing after circumcision and applied to boils/septic wounds, to alleviate pain and to draw out the pus. Weak decoctions of the bulb scales are used for headaches, abdominal pain, weakness and eye condition. Sleeping on a mattress filled with bulb scales wick to relieve hysteria and insomnia [2]	available on Dec/Jan, can not find in the research area and people go to collect in other villages	**Protected** Scarce, heavily traded or with a high price in SA[6]
4.	Apiaceae	*Alepidea amatymbica* [a]	giant alepidia	ikhathazo (Z) iqwili (X) lesoko (S) kalmoes (A)	rhizomes, roots	Treating cough (boiling with water and drink)	Rhizomes and roots are used for colds and chest complaints, asthma, influenza and abdominal cramps [2]	dig whole plant, available all seasons, but difficult to find	Scarce, heavily traded Lower risk; near threatened [6]
5.	Araceae	*Zantedeschia albomaculata* [c]	spotted calla lily, arum lily	intebe (Z, X) aronskelk, varklelie, varkblom (A)	leaves, rhizomes	Used for bringing luck, releasing stomach pain or cleaning stomach	Used as a poultice, to treat frequent miscarriage and used for cattle ailments [3]	dig whole plant, available all seasons and easy to find	
6.	Araliaceae	*Cussonia paniculata* [a] / *Cussonia spicata* [a]	mountain cabbage tree/ common cabbage tree	umsenge (Z,X, S) umsengembuzi (Z) bergkiepersol, kiepersol (A)	leaves, roots	Cleaning stomach and intestine, and also used for treating cough and belly	Recent research investigate using *C. paniculata* to treat infections, inflammation and malaria. *C.picata* leaves used as a treatment for indigestion and roots use for malaria[4]	no data record	
7.	Asclepiadaceae	*Xysmalobium undulatum* [c]	uzara	ishongwe (Z) ishinga (Z, X) bittlerwortel (A)	roots	Treating dizziness, stomachache, and headache	Used to treat diarrhoea and colic, and to treat after birth cramps, dysentery, stomach cramps, headache, oedema (as a diuretic), indigestion, and dysmenorrhoea. Powdered root is a popular remedy for sores and wounds [2]	dig roots, available in the mountains only in Jan, but difficult to find	**Protected** [6]

No.	Botanical name		Common name (English)	Local name [1]	Part use	Propose of use in the research area	Information on use from literatures	Plant availability and harvesting	Conservation status
	Family	Species							
8.	Asphodelaceae	*Aloe aristata* [a]	guinea-fowl aloe	umathithibala (Z,X)	leaves	Used for cleaning body and protect evil spirit	Used traditionally to induce pregnancy and as a protective charm against lightning [3]	no data record	**Protected** [7]
9.	Asphodelaceae	*Aloe sp.* [a]	bitter aloe	umhlaba (Z, X, S) intlambabafi (R)	leave	No data record	*Aloe sp*. is used to treat colds, wounds, ringworm, dysentery in poultry, as a protective charm against lightning and in hide tanning preparations [3]	collect leaves, easy to find in the mountain. Many families cultivated in their gardens	
10.	Asphodelaceae	*Bulbine abyssinica* [a]	bushy bulbine	ibhucu (Z) intelezi (X) geelkatstert, wildekopieva (A) umbona wemfeme(R)	leaves, roots	Treating vomiting	Used to treat bilharzias, dysentery and cracked lips [3] Leaf is used for the treatment of wounds, burns, rashes, itches, ringworm, and crack lips. Roots are taken orally in the form of infusions to quell vomiting and diarrhea, and also to treat convulsions, venereal disease, diabetes, rheumatism, urinary complaints and blood disorders [2]	no data record	
11.	Asphodelaceae	*Many species of Asphodelacea (mainly;Gasteria spp,. Haworthia spp, Aloe spp)* [a]		Intelezi, inhlaba - empofu (Z, X)	leaves, roots	Used for stomach-ache, diarrhoea, high blood pressure, cleaning blood, stomach, and bringing luck	*Gasteria spp.* used to treat hysteria and for protective charms; *Haworthia spp*. used to treat stomach complaints and as a protective charm, particularly against lightning [3]	dig whole plant, available all seasons and easy to find in the mountain. Many families cultivated in their gardens	Whole genus *Haworthia* is protected [8]
12.	Asteraceae	*Helichrysum odoratissimum* [a]	everlastings	imphepho (Z,X) Kooigoed (A)	all parts (mainly use leaves and twigs)	Used to clean stomach, treat cough (mix with ikhathazo), fever, headache protect evil spirit and lightning. This plant is also used to invoke ancestors	Leaves burnt to fumigate a sick-room, treat coughs, colds and to invoke the goodwill of the ancestors. [3] It is also used to treat fever, infections, headache and menstrual pain[2]	collect branches with leaves, available all seasons, easy to find and a lot of this plant in the research area	
13.	Asteraceae	*Helichrysum herbaceum* [a]	monkey-tail everlasting	imphepho-yamakhosi (Z)	all parts (mainly use leaves and twigs)	Used to protect evil spirit, lightning, invoke ancestors and mixed with imphepho to treat when twin are sick	Plant burnt to invoke goodwill of ancestors [3]	collect branches with leaves and flowers, available all seasons, easy to find and a lot of this in the area	

No.	Botanical name		Common name (English)	Local name [1]	Part use	Propose of use in the research area	Information on use from literatures	Plant availability and harvesting	Conservation status
	Family	Species							
14.	Asteraceae	*Helichrysum aureonitens* [a]	golden everlasting	imphepho-emhlophe, ikondlwane (Z) gouesewejaartjie (A)	leaves, twigs	Used to protect evil spirit, prevent lightning (keeping leaves at home or when go out side during storm, rain), and invoke ancestors	Plant burnt to invoke goodwill of ancestors and by diviners to induce trances [3]	collect branches with leaves and flowers, available all seasons, easy to find and a lot of this plant in the area	
15.	Asterceae	*Artemisia afra* [a]	wormwood	umhlonyane (Z,X) wildeals (A)	leaves, roots	Treating cough and fever	Widely used numerous ailments, mainly, coughs, colds and influenza- but also fever, loss of appetite, colic, headache, earache, malaria and intestinal worms [2]	collect only parts to use, available all seasons and easy to find	
16.	Asteraceae	*Chrysocoma oblongifolia* [a]	bitter karoo bush	sehalahala (X) bitterkaroobossie (A) pilapila (R)	leaves, roots	Treating diabetes	Used as fuel plant in mountain area, become weedy in disturbed areas [3]	dig whole plant, available all seasons, easy to find	
17.	Cannabaceae	*Cannabis sativa* [b] (Native to central Asia, Europe)	marijuana	nsangu (Z), umya (X), matokwane (S) dagga (A)	leaves, flowers	no data record	Used for snake bite, malaria, blood poisoning as well as to alleviate the nausea caused by chemotherapy, stimulate appetite and a sense of well-being in AIDS patients , treat of asthma and depression [2] Current legislation prohibits the cultivation, possession and trade in *Cannabis* in South Africa [4]	collect flowering tops and associated leaves, easy to find	
18.	Celastraceae	*Gladiolus spp.* [a] *(possible;G. crassifolius, G. oppositifloru)*	thick-leaved gladiolus/ salmon gladiolus	ingangulazi, igulusha (Z) indabulovalo (R)	corms	Used for releasing fearfulness	*G. crassifolus* used to cure headaches [3]	dig whole plant, easy to find but not available in winter,	Protected [7]
19.	Dipsacaceae	*Scabiosa columbaria* [b] (native to Europe)	wild scabious	ibheka (Z,X)	no data record	no data record	Used to treat sterility, colic, venereal scores, painful menstruation, sore eyes and to ease childbirth [3]	no data record	
20.	Ebenaceae	*Euclea spp.* [c]	magic guarri, natal guarri, common guarri	gwanxe (Z) umgwali (X) mokwere kwere (S) umshekisane (R)	roots	Cleaning intestine	Using to treat heart diseases, headache and toothache [3]	dig and take some parts of root, leave the hole to let new shoot regenerate, available all season and easy to find	
21.	Euphorbiaceae	*Euphorbia spp.* [a] *(possible; E. woodii, E.Clavarioides)*	wood euphorbia/ lion's spoor	inhlehle, isihlehle (Z) vingerpol (A)	no data record	Use for treating skin scores	*E. clavarioides* used to bathe swollen feet and, with other species, to treat leprosy [3]	available all seasons and easy to find in the mountain	

No.	Botanical name		Common name (English)	Local name [1]	Part use	Propose of use in the research area	Information on use from literatures	Plant availability and harvesting	Conservation status
	Family	Species							
22.	Euphorbiaceae	*Ricinus communis* [b] (native to Asia)	castor oil plant	umhlakuva (Z,X) bloubottlelboom (A)	cultivated in garden	protecting from evil spirit	Oil from the seeds is used as medicine; leaf infusions, administered orally or as enemas are used for stomach ache; root and leaf poultices are applied to wounds, sores and boils [2]	plants are cultivated in the gardens, no data about available of wild plants	
23.	Fabaceae	*Elephantorrhiza elephantine* [a]	elandsbean	intolwane (Z, X) mositsane (S) elandsboontjie (A)	rhizomes, roots	Treating stomach problems and diarrhoea	Used to treat diarrhoea and dysentery, stomach disorder, haemorrhoids and perforated peptic ulcers , and as emetics. It is popular for the treatment of skin diseases and acne [2]	no data record	Rare [6]
24.	Fabaceae	*Rhynchosia sp* [a]		sithoyana (R)	root	Cleaning body for luck	Some species of *Rhychosia* used for remedy illness, i.e, *R. carbaea* is used to treat rheumatic pains and headaches, *R. adenodes* to treat dysentery in calves [3]	dig root and leave some parts for regenerate, available all seasons and easy to find	
25.	Gunneraceae	*Gunnera perpensa* [a]	river pumpkin	ugobho (Z) qobo (S) rivierpampoen (A)	rhizomes	De worming and use for better health, cleaning body during pregnancy	Mainly use to induce or augment labor and as an antenatal medication to tone the uterus. It is also used to assist in the expulsion of the placenta, treat stomach trouble, rheumatic fever, swelling , menstrual pain and stomach bleeding or applied externally for the dressing of wounds and for psoriasis [2]	dig whole plant and collect rhizomes, grow in the wet area	
26.	Hyacinthaceae	*Eucomis autumnalis* [a]	common pineapple flower	umathunga (Z) ubuhlungu becanti (X) wildepynappel (A)	bulbs	Cleaning skin and remedy backache	Treating urinary and pulmonary ailments and fever [3] Used for low backache, urinary diseases, stomach ache, colic flatulence, hangovers, syphilis, facilitate childbirth, coughs, biliousness, lumbago, blood disorders, diarrhoea, venereal disease [2]	dig whole plant, harvest in summer and not available in winter	**Protected** [7]
27.	Hypoxidaceae	*Hypoxis hemerocallidea* [a]	star-flower (incorrectly known as african potato)	inkomfe (Z) ilabatheka (Z,X) ilabatheka-emnyama (Z,X) terblom, gifbol (A)	corms, roots	Treating high blood pressure, stomach problem, diabates and fights all illness	Use dto treat headaches, dizziness, mental disorders and, in western medicine, to treat cancers, inflammation and HIV [3]	dig whole plant, harvest in summer and not available in winter	**Protected** Heavily traded, unsustainably harvested [6]
28.	Lamiaceae	*Mentha longifolia* [a]	wild spearmint	ufuthane lomhlanga(Z) inxina, inzinziniba (X) kruisement (A) phathana (R)	leaves	Used to treat cough	Used to treat chest complaints, wounds, headaches, stomach pains and during pregnancy to ease labour [3]	collect brunch and leaves, available all seasons and easy to find	

No.	Botanical name		Common name (English)	Local name [1]	Part use	Propose of use in the research area	Information on use from literatures	Plant availability and harvesting	Conservation status
	Family	Species							
29.	Lamiaceae	*Plectranthus grallatus* [a]	tuberous spur-flower	umnyamawempunzi (Z,X) knolspoorsalie (A)	na data record	no data record	Many species of *Plectranthus* use to treat fevers, coughs, colds, abdominal upsets and as a mouthwash for loose, bleeding teeth [3]	dig whole plant, and easy to find	
30.	Liliaceae	*Asparagus asparagoides* [a]	smilax, bridal creeper	inkunzimbili, ibutha(Z) isicakathi (X) Isicakathi (A) ubulawu-obubovn (R)	leaves, roots	Used for cleaning body, vomiting and invoke ancestors	Used to treat sore eyes and as a charm to increase fertility of cattle [3]	dig whole plant, available all seasons and easy to find	
31.	Loganiaceae	*Buddleja salviifolia* [a]	butterfly bush	ilotshane (Z,X) witsalie (A) isikhonkwane (R)	planting in the garden	Prevention of lightning	A decoction of roots provides a remedy for cough and for relief of colic while an infusion of the leaves is applied as an eye lotion [4]	dig whole plant with root to cultivate, available all seasons and easy to find	
32.	Nyctaginaceae	*Boerhavia diffusa* [b] (Native to USA)	erect boerhavia spiderling	isilepe (Z,X) regop boerhavia (A)	root	Protecting from lightning or thunder	Used to stimulate the emptying of the gallbladder, as a diuretic, treat all types of liver disorders, gallbladder pain and stones, urinary tract disorders, renal disorders, kidney stones, cystitis, and nephritis and use as a digestive aid, laxative, menstrual promoter and to treat gonorrhea, internal inflammation of all kinds, edema, jaundice, menstrual problems and anemia [5]	available during Dec-Jan, cannot find in the villages	
33.	Proteaceae	*Faurea spp.* [a] / *Protea spp.* [a]	beachwood/ sugarbush	isiqalaba (Z,X) boekenhout, suikerbos (A)	nectar, stem bark or root bark	no data record	*Protea spp* –the syrup use to remedy for chest disorders and formed an ingredient of cough mixtures, treat diabetes. The bark is used to treat bleeding stomach ulcers and diarrhea [2]	no data record	Protected [7]
34.	Ranunculaceae	*Ranunculus multifidus* [b] (native to Madagascar)	buttercup	uxhapozi, ishashakazame, isijojokazana (Z) Botterblom (A) umphondovu (R)	roots	Treating cough, high blood pressure and use for preventing of lightning	Used to treat coughs, headaches, urinary complaints, throat ulcers, wounds and pain [3]	dig whole plant (not touch young plant), easy to find only in summer	
35.	Rhamnaceae	*Helinus integrifolius* [c]	soap plant soap creeper	ubhubhubhu, uxuphukwekwe (Z) ityolo, ubulawu obude, ukumbuqwekwe (X) Seepbos (A)	no data record	no data record	Used to treat hysteria, backache and to sooth irritation caused by sandworm [3]	no data record	

No.	Botanical name		Common name (English)	Local name [1]	Part use	Propose of use in the research area	Information on use from literatures	Plant availability and harvesting	Conservation status
	Family	Species							
36.	Rhamnaceae/ Flacourtiaceae	*Noltea africana* [a] / *Gerrardina foliosa* [a]	soap dogwood / krantz berry	umaluleka (Z,X) seepblinkblaar/ kransbessie (A)	no data record	no data record		no data record	
37.	Rosaceae	*Agrimonia procera* [b] (introduces from Europe, Asia)	agrimony	umakhuthula (Z), bohome, mosinoanao-monyenyane (X) geelklits (A) ubulawu (R)	leaves, roots	Cleaning body, use for vomiting and to invoke ancestors	Used to treat coughs and intestinal worms [3]	dig whole plant, available all seasons, easy to find	
38.	Rubiaceae	*Pentanisia prunelloides* [a]	wild verbena	icimamlilo (Z,X) sooi-brandbossie (A)	tuberous root	Treating fever and use for better health	Decoctions are often used for burns, swellings, sore joints and rheumatism, use to treat heartburn, vomiting, fever, chest pain, toothache, tuberculosis, blood impurities, hemorrhoids and snakebite and taken regularly by pregnant women to ensure an easy childbirth, a leaf poultice is applied for a retained [2]	no data record	
39.	Rubiaceae	*Richardia brasiliensis* [c]		isibebesegusha (R)	root	Used to remedy body itchy		dig whole plant, not available in winter	
40.	Scrophulariaceae	*Selago sp.* [a]		isirhalakahla (R)	leaf	Bringing luck, mix with pilapila for treating diabetes		collect brunch in summer, easy to find but not available in winter	
41.	Vitaceae	*Rhoicissus tridentat/ digitata /tomentosa* [a]	wild grape, baboon grape	isinwazi (Z,X) bobbejaantou, bobbejaandruif (A)	roots, tuberous root	Protection of vomiting	Used for smooch ailments, kidney and bladder complaints, infertility and dysmenorrhoea; administered as an enema for delayed menstruation and to facilitate childbirth [2]	no data record	Heavily traded & unsustainably harvested at the Eastern Cape Province [6]

[a] native to South Africa, [b] alien invasive plants, [c] could not specify

[1] Local name: Z-Zulu, X-Xhosa, S-Sotho, A-Afrikaans, R- from Research area

[2] Wyk *et al* (1997)

[3] Pooley (2005)

[4] http://www.plantzafrica.com

[5] http://www.rain-tree.com/ervatostao.htm

[6] Dold and Cocks (2002);

[7] Diederichs (2002); [8] http://www.sanbi.org/biodiversity/ecapeprotect.pdf

4.1.2.2 Scarce species

8 species are identified by Inyanga and Sangomas as the scarce species in the research area. Those species are *Boerhavia diffusa*, *Elephantorrhiza elephantina*, *Alepidea amatymbica*, *Xysmalobium undulatum*, *Boophane disticha*, icham, isirwase and inqwebeba. One of the healers told us that *Boerhavia diffusa* and isirwase can not be found in Makomereng and Pepela. Healers go to Lesotho to collect *Boerhavia diffusa* and to other villages e.g. Sgoga to get *Elephantorrhiza elephantina*. These species are also available in the markets or pharmacy shops. By questionnaire survey, we found one family that is growing *Boerhavia diffusa*.

Two healers reported that *Alepidea amatymbica* and *Xysmalobium undulatum* are more difficult to find compared to the past. However, another Sangoma does not have the same perception telling us that it is still easy to find *Alepidea amatymbica*, but from our direct observation during field walk she showed us the plant samples but had to walk very far to collects *Alepidea amatymbica*. This explains that *Alepidea amatymbica* is not so easy to find as she said. Unfortunately we could not mark the location of *Alepidea amatymbica* by GPS because the Sangoma did not allow us to follow her due to her spiritual belief[1].

The management team also mentioned that *Alepidea amatymbica* and *Xysmalobium undulatum* become rare now. The conservation status of *Alepidea amatymbica* was reported as scarce, heavily traded or with a high price in South Africa but lower risk and near threatened, while *Xysmalobium undulatum* is in the list of protected plant (Dole and Cocks, 2002).

4.1.2.3 Most preferable species

Popular species of use by questionnaire survey are shown in Fig 1. The most frequency use is *Alepidea amatymbica* and followed by *Helichysum spp*, *Artemisia afra*, *Xysmalobium undulatum* and species of Asphodelace (intelezi)[2], respectively. Consistently, ranking and scoring with collectors[3] show *Alepidea amatymbica* is also the most frequently used (Fig 3). However, *Alepidea amatymbica* is scored as the most frequently used species but it is ranked

[1] It is likely that if we had followed her, we would have slowed down her working process; she would like to come back by mid-day.

[2] Mainly species are *Gasteria spp,. Haworthia spp and Aloe spp*

[3] Collectors refer to villagers who go to collect medicinal plants mainly purpose for household consumption.

as the second most important species. *Eucomis autumnalis* is the most important and preferable species because it is used not only for treating diseases but also for making people vomit to clean the body. Furthermore, many kinds of diseases can be treated with this species, and it has immediate effect.

Traditional healers also see *Alepidea amatymbica* as the most frequently used and collected species. Other popular species are shown in box 1.

Those popular species are mainly used for treatment of simple diseases for example, cough, headache, stomachache and diarrhea. These diseases can be treated by *Alepidea amatymbica* and *Xysmalobium undulatum*.

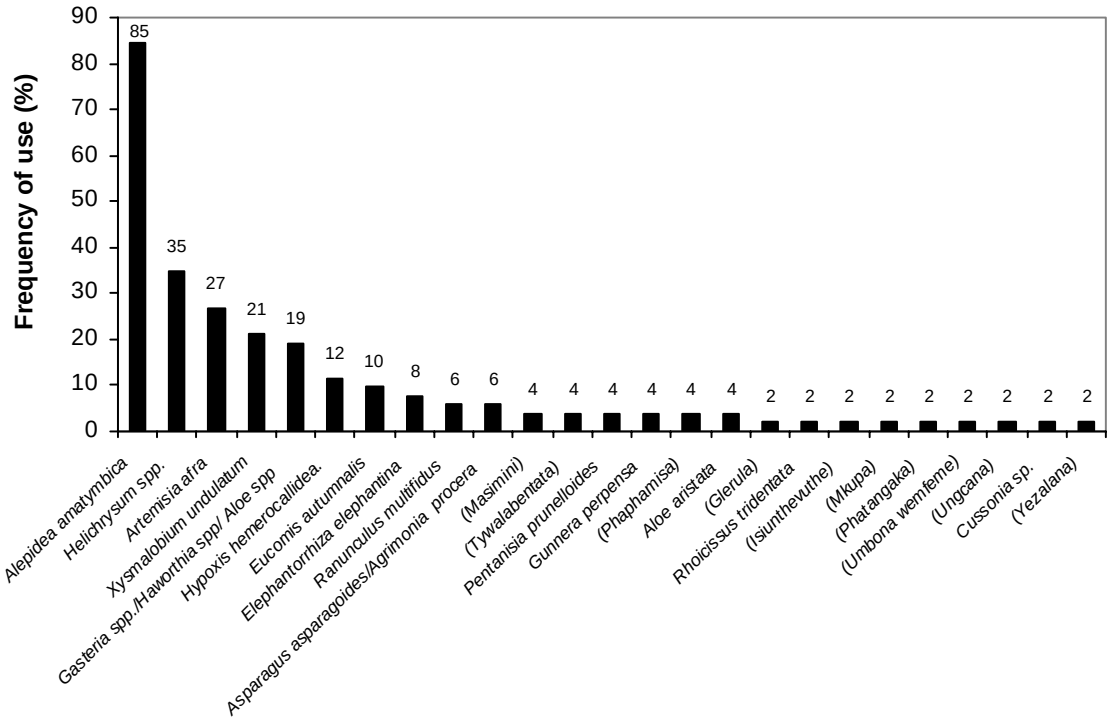


Figure 3: Frequently used species of medicinal plants (in parentheses are local names)

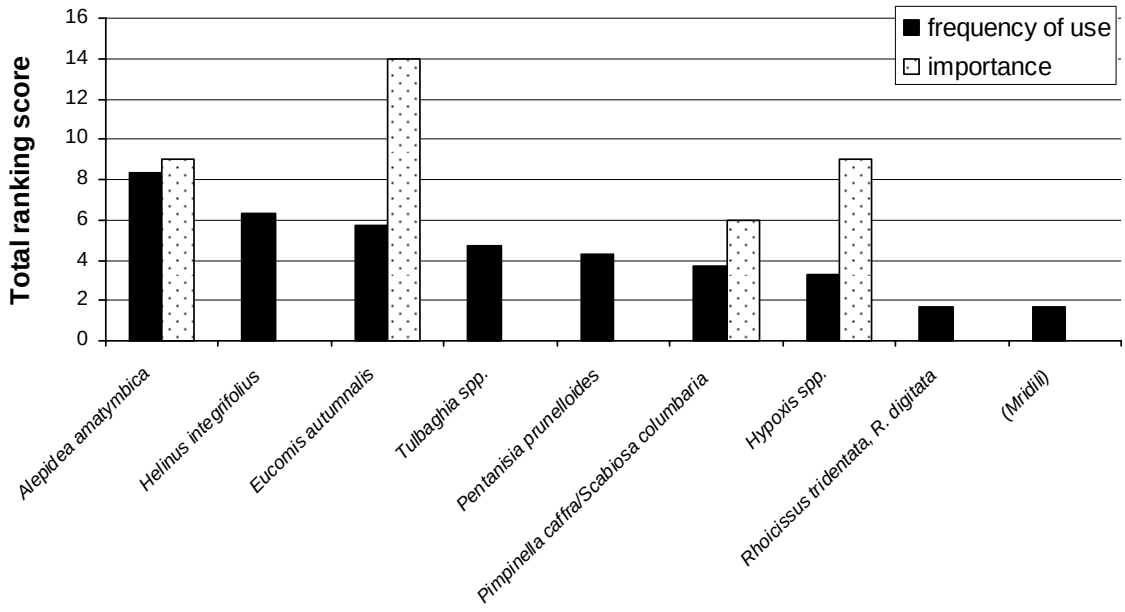


Figure 4: Medicinal plants ranked by order in term of frequent use and importance (in parentheses are local names)

Box 1: Frequently used species mentioned by healers

Frequently used species were mentioned by:
Sagoma of Pepela:
Eucomis autumnalis, Aloe aristata, *Xysmalobium undulatum* and sirwece.

Inyanga's son of Makomereng:
Alepidea amatymbica, Eucomis autumnalis, *Euclea sp.* and mridili,

Inyanga of Makomereng:
Boerhavia diffusa, *Boophane disticha*, *Euphorbia sp*, *Hypoxis hemerocallidea, Xysmalobium undulatum*, *Noltea Africana and Gerrardina foliosa,* magageni, ilimilenkomo, icham, , inqwebeba, and umsilengwo

4.1.3 Seasonal calendar

(Author: Parichart Promchote)

Availability of most medicinal plants in the study area depends on seasons. It is hard to find medicinal plants in the winter, which is from June to August, because of cooled climate. In general, plants are available during summer and can easily be found from October to February (see Fig 3). During winter plants die and start to regenerate after August. Generally, the traditional healers do not intensify collection from December to January because they want to

let the plants fully grow. The intensive collection starts in February which is known as a peak period of medicinal plants.

Three of four important species ranked and scored by collectors are more available in summer. Only *Alepidea amatymbica* is available all seasons (see Fig 4). The species which are not available in winter are collected, dried and stored for use in winter. Many plant species have reproductive stages during summer. Hence, if collectors harvest whole plant and touch young plant, it may affect population and availability in the future.

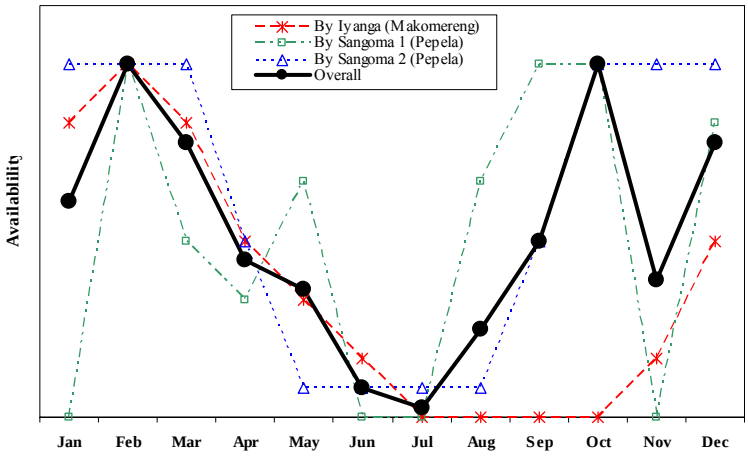


Figure 5: Availability of medicinal plants during the year in general

The overall picture of availability of medicinal plants sharply drops in November and January (fig. 5) because Sangoma 1 perception is not based on the availability of medicinal plants but on how much she collects in November and January.

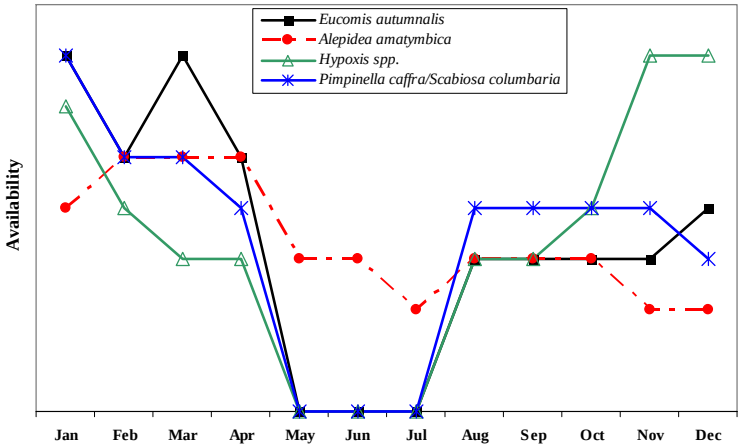


Figure 6: Availability of medicinal plants for main species during the year

4.1.4 Cultivations of medicinal plants

(Responsible author: Fuyun Liu)

Cultivation can be an effective way to decrease the pressure on utilization of wild medicinal plants for commercial trade or household consumption. 35% out of 55 household surveyed are cultivating medicinal plants in their gardens. The reasons for this are that the plants are easily accessible if cultivated. Other people explain that they use it frequently, and want the plant close to the house, and others have the medicinal plants for protection from evil spirits.

We found 13 species that are cultivated in Makomereng and Pepela, where the most frequently grown species are *Gasteria spp./Haworthia spp/Aloe spp.* (intelezi), *Artemisia afra* and isivuthevuthe (fig. 7)

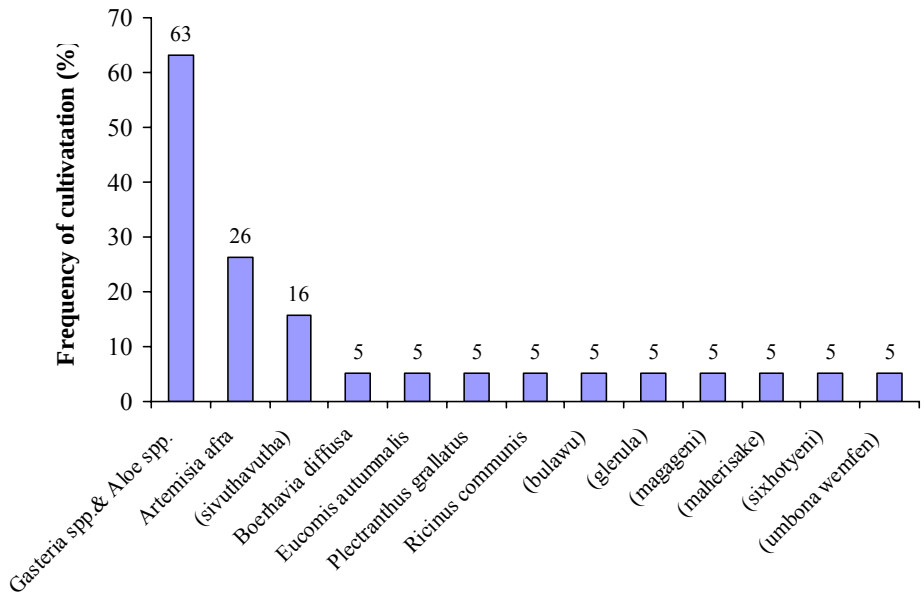


Figure 7: Frequently cultivated medicinal plants

Generally, the growers planted medicinal plants in their home gardens, and they grow with other crops or under the fruit trees. It is our general observation that medicinal plants are not fenced.

They usually get their plant materials from mountains and plant them in the garden during summer.

4.1.4.1 Perception on wild and cultivated medicinal plants

When asking people if they prefer “wild” or “cultivated” or “Both wild and cultivated” medicinal plants, 48%, 46% and 6% of answers are in favour of wild, both wild and cultivated and only cultivated medicinal plants respectively. (fig. 8).

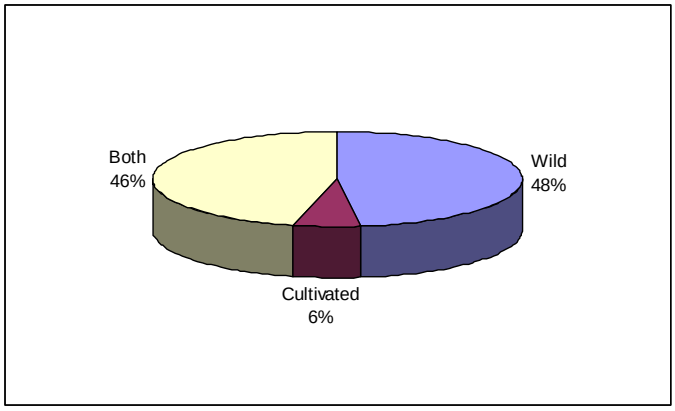


Figure 8: Perception wild and cultivated medicinal plants

Those who choose “wild” option have deeply believed that the wild plants are stronger than the cultivated ones in term of healing power because of clean water and fresh air in the mountain. Some people also say that it is stronger because there is no evil spirits in the mountain. And some argued that the reason for wild plants potency is based on the evidence of effect when used. They do not prefer the cultivated medicinal plants because it is believed that the plants are contaminated with dung or urine.

Accessibility is the main reason explained by those who prefer to choose the cultivated medicinal plants rather than the wild ones. For those who choose both wild and cultivated medicinal plants, they believe that it has the same effect.

4.2 Situation of exploitation

4.2.1 People involved in exploitation

(Responsible author: Parichart Promchote)

4.2.1.1 Number of Inyangas and Sangomas in the study area

In the study area we found 4 traditional healers: one Inyanga in Makomereng and three Sangomas in Pepela. Three of the Sangomas in Pepela were trained by the Inyanga in Makomereng. Traditional healers think that the number of Inyangas and Sangomas has increased. We found one Inyanga and one Sangoma in Mabua, a nearby village of Makomereng and Pepela. The Inyanga from Mabua went to collect medicinal plant from the area around Makomereng and Pepela. Information of healers is in box 2.

4.2.1.2 Number of collectors and hawkers

We did not find any hawkers or commercial collectors in Makomereng and Pepela during the research. Most families (96%) in both villages are using medicinal plants. 47% of 55 households surveyed collect medicinal plants but mainly for purpose of household consumption (Table 2). Nobody knows the people used to collect medicinal plants for sale but knows what commercial collector is. People told that commercial collector were one from the town, such as Durban, came to the villages and asked local people went to collect MAP and sole to them. Commercial collectors were stopped since 2004 that the villages have set rules to collect medicinal plants.

Table 2: Number of households collecting and using medicinal plants

Village	Total household	Household in survey	Household collecting MAP (no.)	Household collecting MAP (%)	Household using MAP (no.)	Household using MAP (%)
Pepela	100	27	16	59	25	93
Makomereng	110	28	10	36	27	96
Both villages	210	55	26	47	52	95

Box 2: Information about traditional healers in the research area

Inyanga (Shadrak) in Makomereang have has been an Inyanga for 16 years. He spent 3 years as Sangoma before becoming Inyanga. He had collected medicinal plants for 39 years since 1967. Now he could not go to collect medicinal plants anymore due to his oldness age. His son continues this activity and has been involved in the collection for 2 years. He usually goes to collect medicinal plants about 3 to or 4 times a week and starting from 5 am in the morning to 1 pm.

Sangoma 1 (Vuyiswa) in Pepela has been a Sangoma for 38 years. Normally, she goes to collect medicinal plant everyday every day from 6 to11 am. She has the cultural belief that she has to come back home by 12 pm to respect the ancestors. When she arrives home, she burns *Helichysum spp.* to let her ancestors know that she is back and to see what she has collected. We walked with her to explore medicinal plants and collect plant specimen.

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Sangoma 2 (Mathiyene) in Pepela has been a Sangoma for 13 years since 1994. She goes to collect medicinal plants in different mountains from Sangoma 1. She said the mountains are far away and she leaves at 6 am and returns home at 3 pm. She goes to collect twice a month.

Sangoma 3 (Mayira) in Pepela was afraid of us and stayed in Matatiele to keep herself away from us

4.2.2 Trend in medicinal plants availability

(Responsible author: Parichart Promchote)

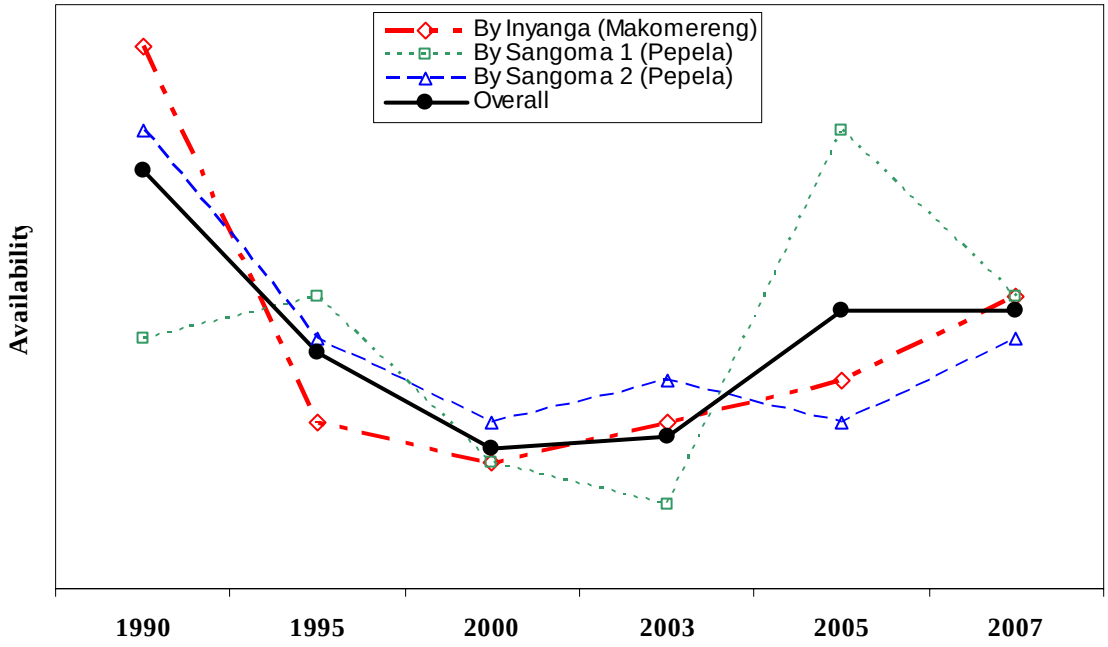

Figure 9: Trend in medicinal plant availability over the year 1990 to 2007

Inyanga in Makomereng and Sangoma 2 in Pepela have similar perception of the trend in availability of medicinal plants. No reason was specified by Inyanga explaining the increase of availability of medicinal plants from 2000 to 2003. He explains that since 2003 the increase was a result of the stop of collection for commercial purposes[4].

Sangoma 1 in Pepela saw differently the trend in availability of medicinal plants. She explains the increase of plant availability in 1995 because of the stop of commercial collection since 1990. In 2000, a significant decrease was observed because before the millennium there was a huge collection to keep luck. The reason for a high increase of plant availability in 2005 is that a great deal of rain which is favourable for medicinal plants growth and furthermore, she did not go to collect because of illness in that year. Cross checked with the management team, there was no stop of commercial gathering of medicinal plants in 1990. Further triangulation with the perception of the two other healers shows that Sangoma 1 perception on availability could not be reliable.

In overall perceptions, the plant availability trends to decline from 1990 to 2003 because of commercial harvesting and then after 2003, plant availability trends to increase. The obvious and possible reasons of the increase are because of the stop of commercial gatherers since 2004.

Although the trend of medicinal plants has increased after year 2003, some traditional healers feel that plant availability is lower than in the past.

Picture 5: Digging whole plant by using pickaxe is one of harvesting technique that Sangoma used (medicinal plant in photo is *Agrimonia procera*; ubulawu)

[4] According to management team, the rule was set in 2004

Table 3: Harvesting techniques, availability and conservation status of frequently used species in the research area

Rank No.	Species	Local name	Part use	Harvesting technique in the research area	Harvest season	Availability in the research area	Conservation status of plant
1.	*Alepidea amatymbica*	Ikhathazo	Rhizomes, Roots	Collect whole part of plant by digging vertically and leave some rhizomes to regenerate new leaves	All seasons	Difficult to find	Scarce, heavily traded or with a high price in SA Lower risk; near threatened [1]
2.	*Helichrysum spp. (*Main species; *H. odoratissimum)*	Imphepho	All parts (mainly use leaves and twigs)	Collect brunchs or whole part of plant but leave main shoots to continue grow and regenerate	All seasons	Easy to find and this specie is a lot in the mountains and around villages	
3.	*Artemisia afra*	Umhlonyane	Leaves	Collect branch with leaves or dig whole plant	All seasons	Easy to find	
4.	*Xysmalobium undulatum*	Ishongwe	Roots	Collect root which destroy some stem, leave some shoots and roots to continue grow and regenerate	January	Available in the mountains only in Jan, but difficult to find	Protected [1]
5.	*Gasteria spp./ Haworthia spp./ Aloe spp.*	Intelezi	Leaves, roots	Collect whole plant but only one to two plants and leave young plants to continue grow	All seasons	Easy to find	Whole genus *Haworthia* is protected [3]
6.	*Hypoxis hemerocallidea*	Inkomfe	Corms, Roots	Dig whole plant to collect corm and roots	Summer	Not available in winter	Protected; Heavily traded, uncertainably harvested and with a high price in Eastern Cape Province [1]
7.	*Eucomis autumnalis*	Umathunga	Bulbs	Dig whole plant to collect bulb	Summer	Not available in winter	Protected [2]
8.	*Elephantorrhiza elephantina*	Intolwane	Rhizomes, roots	Dig whole part of plants to collect underground rhizome, use knife or pickaxe cut rhizome only for use	No data record	Cannot find in the area, people go to collect in other villages	Rare [1]
9.	*Ranunculus multifidus*	Umphondovu	Roots	Dig whole plant to collect root but not touch young plant	Summer	Easy to find but only in summer	
10.	*Asparagus asparagoides and Agrimonia procera*	Ubulawu	Leaves, roots	Dig whole plant	All seasons	Easy to find	

Dold and Cocks (2002); [2] Diederichs (2002); [3] http://www.sanbi.org/biodiversity/ecapeprotect.pdf

4.2.3 Harvesting season, techniques and resource exploitation

(Responsible author: Parichart Promchote)

Most of medicinal plants are collected during summer. The peak period is from February to March during which the availability of plants is more abundant and people usually collect for storage to use during winter time. Harvesting season, harvesting technique and situation of most frequently used species in the research area are shown in Table 3.

Harvesting technique information is relied on interview with traditional healers and direct observation. During field walk with Sangoma and Inyanga's son, we observed that they used pickax and knife to harvest medicinal plants. Pickax is mainly used for digging root and knife is used for cutting roots, rhizomes or some parts of plants. In case that all parts of plants were needed, only some shoots with underground parts were collected and main shoots were left so that it they can continue to grow and generate new shoots. For the bush plants of which only roots were harvested, Sangoma did not fill the hole by explaining that this way can help the plants generate new shoots easier more than filling the hole.

Crosscheck with the management rules, the traditional healers use the equipments e.g. picks or pickaxes, which are in conformance to the rules. The reason for this is based on local knowledge that if they use a spade it will damage the roots but if using a pickax, it can only take a few roots and can leave some behind to allow the new plants to regenerate.

We did not find any people collecting tree bark. But in the past, the Sangoma in Pepela harvested and used bark. The techniques she used were to cut bark off the trees in an area which is equal to the size of a hand, with a sharp knife.

Traditional healers have their own rules[5] to harvest the plants. In our points of view, these rules seem to be based on the conservation practices. They collect only species and parts of plants that they want to use and leave some plants to regenerate. The purpose of collecting medicinal plants is only for healing people in the villages but not for trading.

[5] It is based on respect to ancestors. Sangomas believe that ancestors set up the rules and assign that who should go to collect as well as tell when and where they can collect.

Traditional healers also respect the management rules being applied in the villages. They told us that they are not allowed to collect some scarce species and tree bark. Traditional healers collect medicinal plants in different sites and different species on different days. They also share and tell each others what they collected and found. If other healers from outside the villages want to collect medicinal plants in the research area, recommendation letter or certificate is needed to prove that they are traditional healers and collect medicinal plants only for healing people.

Healers said about some of the commercial collectors that they were the groups who over exploited medicinal plants in this area. One Sangoma said that commercial collectors were not trained by Inyanga and they did not know how to harvest the plant correctly. Commercial collectors harvested all parts of plants by digging whole plants and left a lot of holes they dug. Equipments they used were spades and shovels. With the techniques they used, the plants might not regenerate and it eventually resulted in the rapid decrease in the distribution of plants.

Once the management rules have been enforced in the area, the healers and villagers are still allowed to collect medicinal plants because the management team agrees that "*Inyanga and Sangoma know the proper techniques of harvesting that conserve the resources […]*".

4.2.4 Increased use of species because of health situation

(Responsible author: Parichart Promchote)

The increased use of species because of the health situation is not clearly known. According to traditional healers, *Eucomis autumnalis* and umsilengwo trend to increase in use. These two species are used for treating general and frequent illness in the villages. Umsilengwo is used to cure diarrhea and *Eucomis autumnalis* is used for back pain, headache and cleaning body. However, in Inyanga's view, the trend of medicinal plant use has changed. Before 1994, people used more medicinal plants than after 1994, the demand in use has dropped and the use of Western medicine has increased because of accessibility to the free health services at the clinic and lifting of Apartheid.

4.3 Impacts of medicinal plants

4.3.1 Economical impact

(Responsible author: Jesper Vind)

When we first started to look through literature to get background knowledge of the medicinal plant situation in South Africa, our understanding was that the medicinal plant trade was an income generating activity that accumulated relatively large sums of money for the benefit of the rural poor (Cunningham, 1991; Mander, 1998).
When we arrived in the research area, it did not take much time to see that the area around Makomereng & Pepela is unique, and that the economic impact that applies to other parts of South Africa was not valid here.

Through interviews with Sangomas, Inyangas, and local households, we discovered that income from medicinal plants was an offence. People were not allowed to sell medicinal plants in any form and were only allowed to use the plants for home consumption.
On the other hand, this rule did not apply to all, and a form of double standards towards economical income from medicinal plants was the reality. Sangomas and Inyangas as professional healers were allowed to have some forms of income from medicinal plants that comes in two different forms: 1) Cash income 2) Reciprocal exchange.
The cash income is only used by Sangomas and Inyangas as long as a triviality limit of 20-30R is not crossed. These prices apply to treatments for small illnesses like cough and headache, and this exception from the general income rule for Sangomas and Inyangas is widely accepted by the public.
Reciprocal exchange is being used by Sangomas and Inyangas when the triviality limit is crossed and a treatment takes "time". Through interviews we found out that the price for treatment for 2-6 months is around 3000R, and treatment for 6 months onwards is about 5000R+. These prices were backed up by Sangomas and Inyangas in both Makomereng & Pepela, and are defined by the "Traditional Healer Organisation - THO" in a price list shown by the Inyanga in Mabua. Even though, these prices are "fixed", the fee is not collected in cash.
When asking Sangomas and Inyangas why they do not want cash, it is hard to get a straight answer, which indicates that it is a sensitive subject.

Sangomas and Inyangas on the other hand explained that they prefer to be paid with animals e.g. chickens, goats, and cattle when the triviality limit is crossed. An explanation to this phenomenon can probably be found in Marcel Mauss theory about "Gifts".

Mauss uses the term *"Total Services"*[1] (Mauss 1925) to explain what happens when persons e.g. Sangomas and Inyangas give a gift = treatment. When the Sangomas and Inyangas treat really ill people it is a *"Gift"* and a *"Total Service"*. Mauss explains that the total service is very important for the people involved because it is more than an exchange, it tells a story about the persons involved, both giver and receiver. When the Sangomas and Inyangas give their medical services as a "Gift", it tells the receiver and the whole community how they should interpret the Sangomas and Inyangas politically and socially. Being a healer is in many ways connected with being "good", and by giving a total service, the "idea" of the good healer is being maintained. The idea of the good healer is just as important for the Sangomas and Inyangas as their ability to heal. It gives the Sangomas and Inyangas honour, prestige, and *mana*[1] to give total services, and keep the people's understanding and interpretation of the "Healer" as a good person who is willing to help at any time fresh and real.

By giving a total service, Sangomas and Inyangas also get power over the receiver until they pay for the service they have been given. Marcel Mauss says that: *"To refuse to give, to fail to invite, just as to refuse to accept, is […] to declaring war; it is rejecting the bond of alliance and commonality"*. In other words, there is much more at stake when Sangomas and Inyangas treat people, it is a power struggle where the patient is obligated to pay, and it is public theatre that gives the healers symbolic capital in return. (Explained in box 3)

When asking a Sangoma in Pepela if everybody paid her for her services, she said: *"No but they never come back if they don't"*. People know very well what they have to give back after a total service, and are very aware of the prices when using the traditional healer system. The situation where people stay away when they don't pay the healers, tells something about how embedded the cultural understanding of shame attached to people is when they offend and owe services to the healers.

We witnessed this reciprocal exchange first hand, when we went on a field walk with a Sangoma from Pepela. When we returned, our interpreter informed us that it would be a good idea to give the Sangoma a chicken as a token of our respect and thank her for her help. We

know that the price of a chicken[6] was more then the triviality limit of 30 R, and to triangulate the theory we asked the interpreter if we could pay her in cash? The answer was no, it was not well thought of and not something that people normally did.

Looking at the general economical income in the research area from medicinal plants, there are 3 types of economical income. The first is a small scale income that is narrowed down to the Sangomas and Inyangas for medical services under the trivial limit of 30R. This income is not the main household income, and through interviews we were told that healers were more depending on pensions and remittance than this limited income. Another income from medicinal plants is the reciprocal exchange of farm animals after major medical services. These services do not happen very often due to the accessibility of clinics after 1994, and healers do not have a lot of income through livestock. The third income is a more abstract income, a symbolic capital (See box 3) that gives the Sangomas and Inyangas their position and influence in society. This power should not be neglected, because this income from their medicinal services is a major factor in the Sangomas and Inyangas understanding of themselves, and in society. The Sangomas and Inyangas spiritual practice is embedded in deep layers of cultural value, and because people see the Sangomas' and Inyangas' role in society as important in their daily understanding of their spiritual world and religious reality, it gives the Sangomas and Inyangas symbolic capital.

Box 3: Symbolic capital as explained by Pierre Bourdieu

"Symbolic Capital" can be every characteristic a person can have, that members of a group or society see as valuable or important. These characteristics can e.g. be skills like craftsmanship etc, but can also be more abstract skills like being able to explain existentialistic questions of religious, spiritual, or psychological nature. To have and to be able to control how symbolic capital should be interpreted in a society is always connected with power, and people who can and are able to accumulate symbolic capital around them self are always influential people in their own right.

(Source: Bourdieu, 1980)

6 The price of a chicken is 30-60R.

Looking beyond the research area Makomereng & Pepela, we witnessed "Hawkers"[7] that are selling medicinal plants on the street in Matatiele. Through semi-structured interviews we estimated that these women earned 300-500R a month, but they were still depending on pensions and remittance from family. These women did not gather medicinal plants from the mountains around Makomereng & Pepela and used bark and other plant parts that people are not allowed to use in Makomereng & Pepela.

The fact that Hawkers are common in nearby cities is an indication that the economical impact in the research area Makomereng & Pepela are unique and that it does not necessarily apply to other parts of South Africa.

4.3.2 Health impact

(Responsible author: Proyuth LY)

Traditional medicines have important roles in the health care delivery systems in South Africa. During speech at Official Opening of the Conference on Traditional Medicine in 2004, the minister of health addressed that: "*Traditional medicine is a very important part of South African heritage"*. In South Africa alone, it is estimated that there are approximately 200 000 traditional health practitioners. These health practitioners are the first health care providers to be consulted in up to 80% of cases, especially in rural areas, and are deeply interwoven into the fabric of cultural and spiritual life. It is for this reason that there has been recognition of traditional medicine practice in South Africa (Minister of Health, 2004).

For the local community, medicinal plants are deemed complementary to western medicines. 95% out of 55 households surveyed are using indigenous medicines. It is basically used for treating some simple diseases such as cough, headache and pain[8]. People reported that it is also used at the same time with western medicines for high blood pressure, diabetes and stomach ache. Cough, head ache, pain, stomach ach, high blood pressure, diarrhea and arthritis are the 7 top diseases the people are frequently suffering from in the research area with up to 84%, 47%, 31%, 24%, 18% and 11% of study household have experienced respectively (Fig.10).

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7 "Hawkers" are the poorest medicinal plant stakeholders. They are predominantly (75%) women, have a low level of education (50% having no schooling, 41% having left school after junior level) and the majority (57%) is earning less then 500R per month (Cocks et al. 2004).

8 It is grouped from many kinds of pains such as knee pain, back pain etc

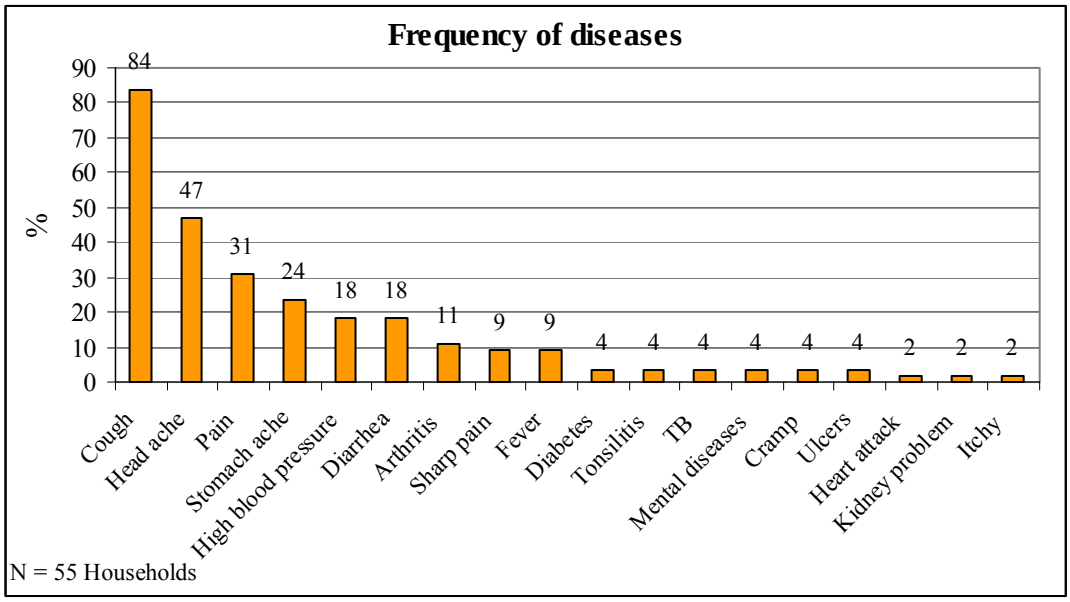

Figure 10: Frequency of diseases

First option for local community to treat diseases is clearly illustrated in (Fig. 11). More than 60% of interviewees who have experienced cough choose to use indigenous medicines.

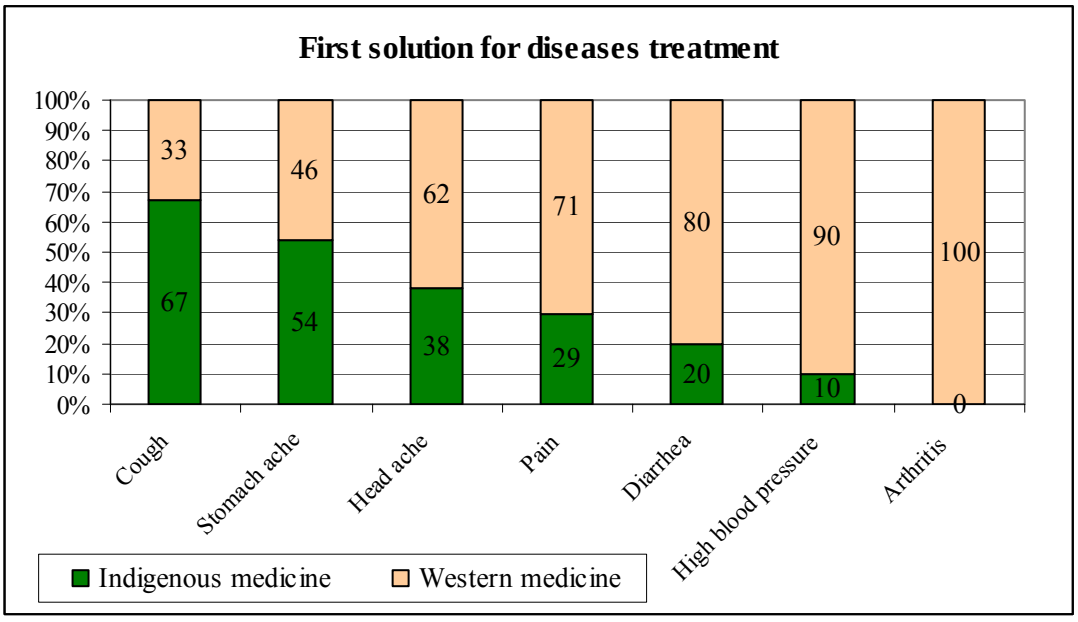

Figure 11: First solution for diseases treatment

Positive effect of indigenous medicines on health is observed by the users (Table 4) and more than 90% of them are committed to keep on using medicinal plants in the future. Accessibility[9], efficiency[10] and affordability[11] are the main reasons for local community to

9 In the research area, the mobile clinic comes only once a month, thus western medicine is not frequently accessible

choose to use indigenous medicines. Efficiency or serious cases are explained as the main reason by most people choosing to use Western medicine before or after using traditional medicines. 100% of all people administrating indigenous medicines know how to produce some traditional medicines. Some indigenous medicines are purchased from healers.

Table 4: Effect of using indigenous or western medicine

Diseases	Indigenous medicine						Western medicine					
	Good		Some effect		Bad		Good		Some effect		Bad	
	Cases	%	Cases	%	Cases	%	Cases	%	Cases	%	Cases	%
Cough	31	100	0	0	0	0	13	93	1	7	0	0
Head ache	10	100	0	0	0	0	16	100	0	0	0	0
Pain	5	100	0	0	0	0	11	92	1	8	0	0
Stomach ache	7	100	0	0	0	0	6	100	0	0	0	0
High blood pressure	1	100	0	0	0	0	9	100	0	0	0	0
Diarrhea	2	100	0	0	0	0	8	100	0	0	0	0
Arthritis	-	-	-	-	-	-	6	100	0	0	0	0

The perception we got from medical doctors at clinic and hospital is that the use of indigenous medicines may have negative effect on the health of people's health. A doctor at Maluti Health Clinic argues that pregnant women usually visit a traditional healer before coming to the clinic. The traditional healer gives them a mixture which causes them to go into labor very quickly. This can cause problems as it can result in a ruptured uterus which can be fatal. People with HIV and AIDS who are making use of medicinal plants at the same time as using anti-retrovirals (ARV's) are also a major problem as these two types of treatment clash, resulting in a reduction of life expectancy.

Another example was given related to the treatment of TB by traditional healers. They believe that when patients get a bad cough, people need to purge or cleanse their system. This involves taking a mixture that causes people to vomit. If the vomiting is excessive it can result in vomiting blood and damaging the lungs. If the patient has pulmonary TB, this can result in death.

The medical doctors discourage the use of indigenous medicines, especially at the same time as using Western medicine, because the indigenous medicines can alter a person's metabolism, meaning that doses of the medication have to be changed for the treatment. The

10 Apart from medical substances, medicinal plants have also its cultural value.

11 The price for medicinal plants is usually cheap and people can collect them

indigenous medicines also tend to mask the symptoms of a disease making it difficult to make a diagnosis and treatment. Added to this is the fact that patients lie about their use of indigenous medicines when asked, because they know that the doctors disapprove.

The doctors recommend that traditional healers should be trained to recognise the symptoms of certain diseases, like TB so that they know when they should transfer a patient to the clinic rather than treating them themselves. The "Traditional Healer Organisation – THO" has programs in place to register, train and certify traditional healers so that this training can be done but many healers refuse to register.

However, the importance of the health care delivery by traditional healers is recognized at national level.

Box 4: Speech addressed by Minister of Health

It is also important to note that traditional medicines also continue to play a significant role in the treatment and management of life-threatening diseases.

The question that we have to answer given all the statistics I have mentioned is: "Can we afford to ignore traditional medicine and the crucial role it plays in the well-being of our people?"

The answer colleagues I am sure, is a resounding no. We cannot, particularly in the African continent afford to let our heritage, a heritage whose positive impact is known, be lost while our region is faced with serious health challenges.

(Source: http://www.doh.gov.za/docs/sp/2004/sp0330.html)

Box 5: Treatment provided by Inyanga and Sangoma

The interviews were conducted with 2 Inyanga and 3 Sangomas. They provide treatment for a wide range of diseases such as headache, diarrhea, stomach ache, cutaneous diseases, cough, dizziness, sexually transmitted diseases, rashes, epilepsy, sharp pain etc.

Inyanga in Makomereng observes there has been a decrease of people using indigenous medicines since 1994 due to accessibility to the clinic while Inyanga in Mabua states that there is an increase in patients coming to him for treatment.

Sangoma in Pepela mentions that people coming to her for the treatment are like before but they use western medicines at the same time. She doesn't mix western medicines with medicinal plants but she prescribes western medicines for their own. She has a lot of patients and even she often gets called out and sometimes to provide treatment in Johannesburg and Cape Town.

Only Inyanga in Mabua believes he can cure AIDS if he could catch it early enough before the rash caused by AIDS can spread too far. He feels that he satisfies his customer needs, he can treat all diseases. Thus he doesn't need to send his patients to clinics. The others argue that it would be better to send patients to clinic in case of AIDS or mental diseases.

Table 5: Number of visitors to clinic with 5 top diseases (per month)

Illness	**Number**	**Comment**
High Blood Pressure	1300 people	----
Diabetes	300-400 people	----
Epilepsy	500-600 people	----
T.B/HIV	200-300 people	----
HIV/AIDS (Want to be tested)	Female: 90-150 People Male: 40-60 People	Error in the male reading.
HIV/AIDS (People who do not want to be tested).	Female: 50-60 People Male: 20-30 People	Error in the male reading.

(Source: Maluti Health Clinic, 2007)

Through triangulation with other reports on the general health situation in South Africa we have found out that there is a high number of diabetes in the research area (30%) compared to the national level (18%).

The percentage of the prevalence of HIV/AIDS infected females gotten from the clinic is similar to the national statistics. From interviews with the doctors at the clinic we know that the male % had an error because they don't want to be tested for HIV/AIDS. It is the reason why we see that the prevalence of HIV/AIDS infected male is lower from the clinic data than the national statistics. From comparing the two statistics we measure the male error to be 3% (Fig. 12)

Figure 12: Percentage of people infected with HIV/AIDS
(Source: http://www.avert.org/safricastats.htm and Maluti clinic)

From the comparison of the percentage of people with diabetes, the prevalence of diabetes in the research area is much higher than at national level. In the context of medicinal plants this is not very good if people use both types of medicines at the same time. This implies also with HIV/AIDS cases as its prevalence is quite high.

4.3.3 Cultural impact

(Responsible author: Jesper Vind)

Medicinal plants are not only used to cure illnesses, a variety of medicinal plants are connected with ancestral beliefs and protection from evil spirits. Through our questionnaire survey, it is clear that people believed that the area around the village is infected with various kinds of evil spirits and witches.

Witches are real people and stand in complete contrast to the Sangomas & Inyangas, by using their powers to destroy and do evil deeds. Witchery can be taught, and both Inyangas & Sangomas showed us evil plants that were used for witchery.

Evil spirits and ancestors are elements from another world. They are not human, and there is sometimes an overlap between evil spirits and ancestors. Evil spirits for example is basically evil beings, but can at the same time be ancestors that are being controlled by witches. If not controlled by witches, ancestors can both be good and bad. Whether an ancestor is good or bad, it is very much controlled by oneself and medicinal plants are the key to keep contact with the ancestors and be friends with them. "Imphepho" (*Helichrysum spp*)is one of these medicinal plants that when burned is used to communicate with the ancestors.

On a field walk we were shown a plant that could protect us against lightning, and our Sangoma guide told us that a man from Pepela was killed by lightning on our first day in Pepela because he did not respect his ancestors.

Picture 6: "Imphepho" (*Helichrysum spp)* and Sangoma with lightning protecting plant.

4.4. Management of medicinal plant

4.4.1 Historical background

(Responsible authors: Proyuth LY, Jesper Vind)

Since 1968 and onwards to 2002 there have been open access to the mountains around Makomereng & Pepela. Private and commercial gathering of medicinal plants took place in this period, though commercial gathering was not very organised. Commercial gatherers collected plants in plastic bags and stored the medicinal plants until they had enough to sell to medicinal plant buyers who came to the villages.

Large scale commercial gatherers entered the area in 2002, when they worked together with a local Sangoma who helped the gatherers to find the medicinal plants they needed, and housed the gatherers in her own house in Pepela.

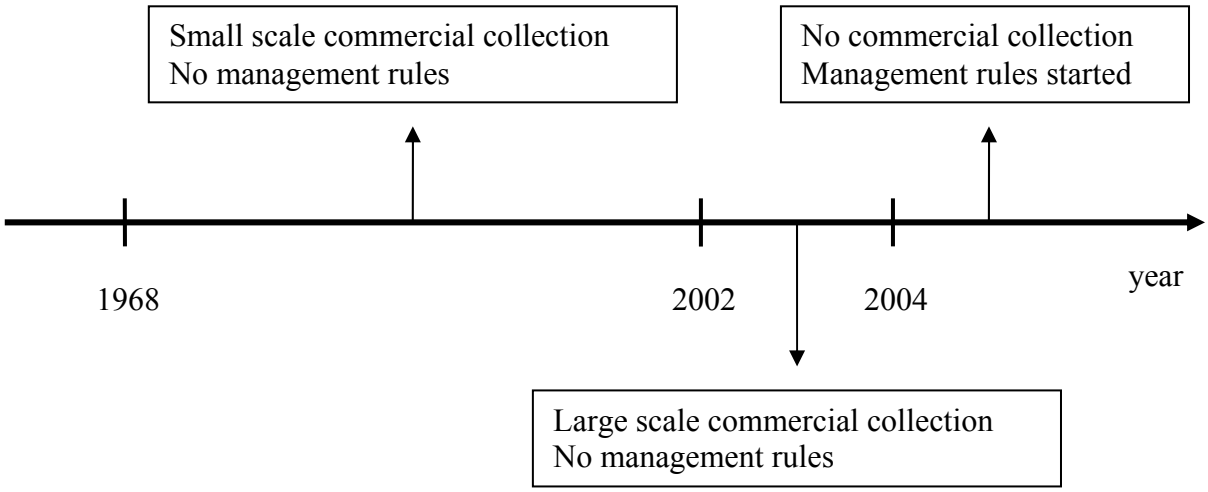

Figure 13: Historical background of management of medicinal plants

In the period 2002-2004, medicinal plants were carried out of the area on trucks with loading capacity up to 3 tons, in an unknown interval. How much plant material that was carried out of the area is uncertain, but it was so much that local healers were worried and asked for help to stop the gatherers from the local chief and newly elected management team. Because of the infrastructure in the area it was easy to stop the gatherers as people could see them coming down the road in their big trucks. The management team replied in a focus group meeting that they had had no problem stopping the commercial gatherers, and that they had not had that kind of problems since 2004.

The case with the commercial gatherers sounds like a success story and to our knowledge it is true that there are no commercial gatherers in the area at present. On the other hand it is not

clear if we get the whole truth in this case. We know that shortly after the commercial gatherers were "asked" to leave, the Sangoma who helped the gatherers left Pepela and never to return (returned) again. When asking the management team: *"What happened to the Sangoma on the hill here in Pepela?"* the translation was: *"We do not know but she was not chased away"*. It is interesting in this case that the management team had to stress that the Sangoma was not chased away, when there was nothing in the question that indicated that she was. We had a gut feeling that there had been a conflict with this particular Sangoma and the villagers, and our question was a provocative question to get a reaction from the management team. We got that reaction, but whether or not the translation was a 100% one correct we will never know, but maybe the defensive reaction from the management team tells us that the stopping of commercial gatherers did not go as smoothly as the management team and healers in the area would like us to know.

The management rules are very much connected to the 2002-2004 incidents with the commercial gatherers. Using spades and shovels to dig for medicinal plants was the commercial gatherers way of working. The commercial gatherers did not fill the holes, and the incident with cattle breaking their legs happened during this period. There is a strong "Them and Us" feeling (Barth, 1971) when interviewing people in Makomereng & Pepela about the management rules. People from the village explain their way of harvesting as the correct way and project the wrong way of harvesting on the commercial gatherers. The general knowledge about the management rules could be an effect of the relatively recent situation with the commercial gatherers that have amplified the common understanding of the importance of medicinal plants in the area.

4.4.2 Management rules and practices

(Responsible Author: Proyuth LY Jesper Vind)

Through focus group meetings with the management team and interviews with local people[12] who gathered medicinal plants, we realised that there are no overall management plan for the use and utilisation of medicinal plants. No general rules are written down, and the management rules are transferred orally.

The management rules deal with:

- Who is allowed to harvest
- What plants to use and not to use
- How to harvest the plants
- How to use medicinal plants after harvest

The general rules say that everybody in Makomereng and Pepela is allowed to collect medicinal plants in the area for home consumption but not for commercial purposes. Inyangas and Sangomas from outside village are also allowed to collect medicinal plants if they have certificate proving that they are healers.

There is a general consensus that the use of bark for medicinal purposes is not legal, and it is our understanding that ring barking for medicinal purposes is not taking place at present. The plants that are allowed to be used in the research area are generally plant roots, leaves, and herps.

When harvesting medicinal plants the rule for gatherers are that gatherers should leave some of the plant behind, and not use plants that are too young. When a plant is big and on the end of its growth it is allowed to take the whole plant, but only if it is a plant that is easy to find in the area. This is to some extent a very odd rule that could be problematic because gatherers have to have a very broad knowledge about the area and the plants, if the rule should not have a negative impact on the biodiversity.

When harvesting medicinal plants it is important not to use tools like spades and shovels because they cut the roots of the plants horizontally in the process and can kill remaining plants that are left behind to grow. The general harvesting rule is to use picks and pickaxes to loosen the soil around the plant, taking the whole plant out of the ground and cleaning the

[12] Including Sangomas & Inyangas.

roots of soil by hand. This way the gatherers can divide the plant vertically so the upper plant part is still connected with the roots and can live on when replanted after being divided. When making a hole in the ground, it is important to fill the hole after digging, because there have been incidents where cattle have got stuck in the holes and their legs have been broken.
Gatherers are allowed to harvest as much as they please, as long as it is for home consumption, and people are not in general allowed to profit from gathering medicinal plants – even though there are some exceptions.

When talking to traditional healers and households, the general perception on availability is that there will always be the same amount of medicinal plants in the area. This view is not shared by the management team that is aware that the availability since 2004 has gone down, and that some species are hard to find in the area after commercial gatherers have been in the area. We believe that the different perception of availability of medicinal plants is due to different viewpoints. When talking to healers and people from households it is very hard to ask them questions concerning the past and the future. This people generally focus on how things are now, and how things will turn out to be in the future, and to compare the present situation with the past is very abstract to them. Healers e.g. generally believe that medicinal plant availability will be the same. This "fact" should be understood from their point of view, because they gather plants every day and are able to find the plants they are looking for, or other plants that have the same effect as scarce species. This living in the "Now" point of view is reflected when asking healers and households about other factors e.g. fire, wattle spread etc. Fire and the spread of wattle are, or are very likely to, having an affect on the abundance of medicinal plants, but healers and households do not see it as a problem to the availability of medicinal plants.
The management of medicinal plants does not take into account that there is a clash between the perception of abundance and availability in the community, and in the long run this could lead to a "Tragedy of the commons" if the knowledge of abundance is not measured and taken into account. The rules do not say anything regarding overgrazing and fire even if they see it as factors affecting negatively on medicinal plants.

According to Schlaga and Ostrom conceptual analysis for common-property rights and natural resources (Table 6) and based on our analysis of the rules applied in the research area, it is difficult to say in which classes of bundle of rights the local community holds. It is likely to some extension between proprietor and claimant.

Table 6: Bundle of rights associated with positions

	Owner	Proprietor	Claimant	Authorized user
Access and withdrawal	x	x	x	x
Management	x	x	x	
Exclusion	x	x		
Alienation	x			

(Source: Schlager and Ostrom, 1992)

Box 6: Statement by Inyanga in Mabua on problem of commercial gathering

> I have seen commercial gatherers going into the mountains, but not since 2004. They were stopped from coming because they did not care for the land, they did not close the holes they dug and this led to cattle being injured, and soil erosion. They were also stopped because they were taking lots of plants in 80 litre sacks. Furthermore, they were not trained as Inyanga and did not know how to harvest the plants correctly. The local people tried to talk and tell them that they were only allowed to collect 5 litre bags, not 80 litre bags. We had a meeting with the chief and we asked her to tell the collectors to go away. She stopped the trucks and told them that they were not allowed to collect here anymore as we (Sangomas and Inyangas) were upset by it. It would be easy to spot their trucks if they did come back. Also we would notice the holes that they dug.

All Inyangas and Sangomas interviewed are aware of and satisfied with the rules. 50% out of 14 households surveyed in Pepela know that it is not permitted to collect medicinal plants for commercial purposes while the others arguing (argue) that if there were somebody coming to buy medicinal plants in the village, they would go to collect for them.

4.5 Other factors affecting medicinal plants

(Responsible author: Fuyun Liu)

Theoretically, medicinal plant growth basically depends on climatic conditions, ecological environment and other factors such as human activities.

Through focus group meeting, semi-structured interview, field visit and participatory observation, the major other factors which affected medicinal plant growth and its abundance in the study area are fire, wattle expansion/eradication program and grazing.

4.5.1 Fire/burning

(Responsible author: Fuyun Liu)

The fire can influence bud-bearing shoot and density distribution of medicinal plant on the grass land. Fire can destroy the parts of above ground vegetation including medicinal plants. Particularly, it may harm the bud of herb medicinal plants. Fire directly decreases the density and yield on the biome[13] in a short term.

When we interviewed management committee and traditional healers in the village, they all said that fire destroys medicinal plants, especially those which grow on shallow soil. The fire often occurs in the winter season in June and July, which affects the regeneration of medicinal plants in August.

From our research, we could see that fire is the main factor mainly mentioned by local people when they are asked about negative influence on medicinal plants. We agree that this is the main negative factor affecting medicinal plants.

The example was given by Inyanga's son. According to his observation, the medicinal plants in the area which have not been on fire are more abundant than they are in the area which has been on fire.

[13] South Africa consists of 9 "biomes" and in the research area; it is classified as grassland biome.

4.5.2 Wattle spread & Working for water program

(Responsible author: Fuyun Liu)

Through field walks and direct observation we can say that no medicinal plants grow under the wattle but under bushes and grass.

We believe that the wattle expansion poses a space stress and competes with the medicinal plants for water, light, and nutrients. The study area Makomereng and Pepela is widely invaded by wattle.

Picture 7: Wattle in Makomereng and Pepela village

Traditional healers do not see the wattle spread as a constraint to the availability of medicinal plants. This could be the fact that local people's perception on medicinal plant availability is based on how the situation is now, and not e.g. 20 years ago. Wattle could in fact be a problem to the medicinal plants without people knowing, because their perception on medicinal plant availability is based on how much and how easy it is to find medicinal plants. The management team sees the wattle expansion in a different way, believes it kills the medicinal plants.

There is a programme in the research area called "*Working for Water*" of which the purpose is to eradicate wattle by using synthetically chemical products.

The Sangoma from Pepela told us on a field walk that she did not use medicinal plants in the areas where Working for Water program made wattle eradication, because the medicinal plants in the area were polluted by the poison[14]. On the other hand the Inyango from Mabua said that the poison doesn't affect the medicinal plants because they do not grow the same place as the wattle, and the medicinal plants grow higher in the mountains then (than) wattle.

The management team believes that the Working for Water program has a positive effect on the medicinal plants, because once the wattle is eradicated the medicinal plants could grow.

[14] Sangoma says that WFW uses poison to kill the wattle, but it is in fact a chemical.

4.5.3 Grazing

(Responsible author: Fuyun Liu)

The grazing animals such as cattle, sheep and goats might eat the leaves of medicinal plants in the field. However, the extent depends on different factors and specific context.

In the research area grazing is a very common practice, animals can freely graze in the medicinal plant areas. The view on grazing and its effect on medicinal plants are not very clear. There are different views on the grazing situation – no negative effect is e.g. mentioned by the management team while Inyanga in Mabua finds it irritating that cattle eat the leaves of medicinal plants so that he could not recognize them.

There is no management plan for where the cattle can graze and where they cannot. Grazing is in our view a problem for agricultural activities and a general management plans are not needed because grazing is not really a threat to medicinal plants. From the field walk, we know that most of the plant parts used in traditional medicine are from underground parts and cattle do not eat the roots, and furthermore most of the medicinal plants grow in such high altitude that the cattle cannot reach them.

V Result discussion

(Responsible authors: Fuyun Lieu, Jesper Vind, Parichart Promchote, Proyuth LY)

According to Williams *et al.* (2000), we have the perception that the situation of medicinal plants exploitation in the research area was an environmental destructive activity because of commercial collecting. Our assumption was that the resource distribution has changed in the sense that the resource has decreased. This assumption turned out to be true in the period between 2002 and 2004 because of huge commercial gathering in the research area. Because medicinal plants are very important resources, medically and culturally, for the local people, they care about their resources and agree together to stop the commercial gathering as they see it very harmful for their own livelihood. This interference from the community indicates that there is an increase in medicinal plant distribution since 2004, meaning that the statement of Brown (1992) saying that *"the direct local use of the plant resources contributes to the preservation of species and habitats"* is likely to be true.

The most frequently used species in the research area were recorded in the list of the most highly demanded species by the study of Mander (1998). Those species are *Alepidea amatymbica, Eucomis autumnalis*, *Euclea divinorum, Gunnera sp., Helichriysum spp., Helinus integrifolius, Hypoxis latifolia*. *Alepidea amatymbica* was the most frequently mentioned scarce species by the management team, healers and local people in the research area. This species is ranked number 2 on the top 50 of species demanded by consumers reported by Mander (1998). This means that *Alepidea amatymbica* is a species targeted by commercial gatherers and was probably overexploited in the research area from 2002-2004. Furthermore, looking at the botanical characteristics of *Alepidea amatymbica,* it regenerates shoots through the single or branched rhizome (Wyk *et al.,* 1997), meaning that it is vulnerable to harmful commercial harvesting techniques[15].

Mander (2005) estimated that the value of medicinal plants traded in South Africa is approximately R 0.549 –1 billion (≈US$ 75-150 million). This gives us the understanding that the medicinal plant trade was an income generating activity that accumulated relatively large sums of money for the benefit of the rural poor. It is not the case in the research area. We expected that the local healers had more income from medicinal plants, but this was not the case because the local management rule does not allow them to charge high fees for their medical services. On top of this, the free healthcare system that has been in the area since

[15] Collectors dig the whole plants. No possibility of reproduction.

1994 has decreased the numbers of patients for traditional healers and this has lowered the income from medical practices.

Medicinal plants are an important source of primary health care delivery in the villages, in the periods when mobile clinics are not in the area with up to 95% of the households in the research area are using traditional medicine . This reflects the fact that traditional heath care system provides up to 80% of the health care in rural areas as mentioned by The Minister of Health in 2004. Even though traditional medicine plays a major role at the primary health care level, there is a problematic situation between the traditional medicine and Western medicine practice for the serious illnesses. Because Western medicine has not been accessible to local people for very long, they misuse traditional and western medicine at the same time and it has a very negative effect on the treatment for both healing practices.

Beside its medical importance, medicinal plants are locally a holistic tool that can cure not only physical illnesses but also the unexplainable. To understand the meaning of medicinal plants in a local context it is important to see medicinal plants as a part of local people's understanding of their own spiritual world and religious reality, and not only as a cure for pain. The local belief and its religious aspects on medicinal plants give it powers that "western" medicine does not have, and provide medicinal plants with a potent cultural importance.

According to Mander (1998): *"The AIDS Pandemic in the region, and the growing international demand for South African medicinal products, is likely to increase the demand for indigenous medicine products in the future".* To look into this theory we tried to find out if the local health situation was critical, and to see if this situation affected the use of medicinal plants.

We found out that the general heath situation was not very good, due to a high number of people with high blood pressure and diabetes. The percentage of people infected with HIV/AIDS and TB in the area is high, but because it is a sensitive issue, we were not able to find any relation to a possible increase in the use of traditional medicine because of the HIV/AIDS pandemic.

Fabricius *et al.* (2004) emphasized that until recently, biodiversity conservation in South Africa was based on law enforcement approaches, but this approach has failed and new participatory methods are required, i.e., conservation of biodiversity by local community groups. This is true in the research area. The rules which are being applied are effective for the management and conservation of the medicinal plant resources, because the local community takes part in defining the rules, even if it is not available in written format.

Wiersum *et al.* (2005) argued that stimulation of the cultivation of medicinal plants is a means to relieve the overexploitation of natural population. In the research area, there is cultivation of medicinal plants but it is not because of overexploitation. The cultivation is only for personal use and 50% of the households believe that the cultivated medicinal plants are less efficient, which is in connection to Prins (1996) that the South African traditional belief is that cultivated medicinal plants lose power.

Apart from resource utilization, other factors have been found to have effect on the availability of medicinal plants in the research area. During our research it became clear that the wattle spread and the eradication programmes could be a serious factor influencing the medicinal plants distribution. Unfortunately, we do not have much information to say that to what extent the wattle spread and eradication programmes have the effect on the medicinal plant resources.

VI Reflection

(Responsible authors: Fuyun Lieu, Jesper Vind, Parichart Promchote, Proyuth LY)

6.1 Methods

6.1.1 Questionnaire survey

Because it was not possible to conduct a normal questionnaire survey in the sense that respondents have to fill out the questionnaires by themselves, we actually got more precise answers because the respondents could ask questions when they did not understand. Sometimes, we did not have the answers which matched together. As we were on the spot with respondents, we could triangulate and solve out the misunderstanding. We could also ask some other qualitative information with some households.

When we first arrived, we could not identify the households involved in collecting medicinal plants, because of the household survey, we could finally found out and selected households for focus group meeting. With questionnaire survey, we could also identify some medicinal plant species in the research area, which were not mentioned by healers.

The majority of our respondents are female. So it is difficult to say if the answers could be representative of the general population. If we had had more time, we would have been able to make interviews with some male respondents; probably they would have told us more about the abundance or the change of medicinal plant distribution.

6.1.2 GPS mapping

GPS was a useful tool for us which could help us find medicinal plants again after a field walk. Thanks to GPS, we can prove how well distributed the households selected for our questionnaire survey are.

We would like to use GPS to get knowledge of the distribution of medicinal plants, but because of limited time and access, lack of guides, it does not reflect the overall distribution of the resources.

If we had had more time, we would have used it to measure the distribution of medicinal plants in the area so that we could compare it with the local knowledge.

6.1.3 Semi-structured interview

This method provided us with a lot of both quantitative and qualitative information. In-depth information was also extracted.

Because many questions were asked and long time was required, this would have made the respondents lose their concentration because they are quite old. Some people did not have much time for us, so we could not get the same kind of in-depth information as if we had 2 or 3 hours to conduct an interview.

6.1.4 Field Walk

On the first day of our research, we went on a field walk to the area where they collected medicinal plants. This gave us insight in how traditional healers gather, harvest and store medicinal plants, which was very useful knowledge for us during the rest of the research period.

Because of available time of guiders, they could not bring us to the area which is quite far. Thus we could not have knowledge of how the resource distribution in that area is.

It would have been very useful for us if we could have gone on field walks again after we received more precise information on species and plant specimen. Because we had other plans later in our research, and people did not have time to guide us, thus it was not possible to continue this activity.

6.1.5 Temporary sampling plot

In our research design, we wish to measure the density of scarce species of medicinal plants by using the temporary sampling plot . This technique is required to know the specific area that which is representative of the habitat of target species and to have enough replication of sampling plots. We tried to measure the abundance of medicinal plant in the area where Sangoma collected, by using sampling plots and estimated percentage of density of each medicinal plant in the plots. We found out that the methods did not reflect the actual abundance and did not provide us with the data we wanted because the heterogeneity and complexity of the geographical landscape require us to have more replications to make sure that the sampling plots are representative of the area.

We believe that this method of measuring abundances could work under other circumstances, but from a cost-benefit point of view we decided that we would not get the same quantity of data if we still focused on it. Therefore, we shifted our focus on participatory mapping that

would help us get a broader understanding and better conclusions on the resource distribution in the research area.

6.1.6 Plant sampling and identification

Plant specimen were collected for the purpose of plant identification. Identification of species is a really hard task because the species have different local names, different spelling from the plant dictionary and the plant samples were not complete because of techniques of collecting plant specimen and conservation. It is a very long process to be able to make a botanical identification of the species.

Many plant species were obtained from a questionnaire survey. Without plant sampling, it is really hard to botanically identify them.

6.1.7 Direct observation

It helps us to crosscheck the information. For instance, when we asked a family if they used medicinal plants for protection against evil spirits, and they answered no, we could ask them again if it was really true because we saw a medicinal plant species for protection of evil spirits stored on the chicken shed when we arrived. Direct observation was also very useful for the fact that people say wattle spread does not have any negative effects on the availability of the medicinal plants while during the field walk, we did not see any medicinal plants grown under wattle.

6.1.8 PRA

PRA exercises need people being together. In our research, it was really hard to bring people together. For example, it was not possible to bring healers together to make a trend analysis of the availability of medicinal plants, participatory mapping of the resource distribution, ranking and scoring of the most frequently used species and their importance. Instead, the tools of PRA were conducted individually and the comparison of data was done later.

If we had done these tools with Inyangas and Sangomas at the same time, they would have discussed it, and a general consensus on the data would have been more unified. On the other hand, individual exercise gave us other (different) information which we would not have got if people were gathered in a group. For instance, Sangoma in Pepela had completely different perception on the availability of the medicinal plants compared to other Sangoma and Inyangas.

During PRA exercises with villagers who collected medicinal plants, only 4 people were present and a collector seemed to be dominant in the group. Thus it might not reflect the general situation in the research. The general situation would have been represented if more participants were at that time.

The focus group meeting was conducted with the management team of 13 people. During this session, we have learnt a lot. However, 2 of the participants seemed to influence the discussion by speaking in English. By not talking through the interpreter, these participants tried to communicate with us directly and the other participants could not understand what was going on. From this experience, we learn that it is important to inform the participants at the beginning of the focus group meeting that how the communication would be executed.

6.2 Group work

The quality of the research depends on the backgrounds of the research team and their involvement. A research team with interdisciplinary backgrounds is very helpful to achieve the research objectives because we need to look at different aspects to be analysed.

Different backgrounds, cultures, experience, working style create a great challenge for the group work. Along with the working process, the group members did learn many things from each others. At the same time, many contradictory ideas appear because of the different backgrounds, but through an open dialogue, we were able to learn from each other and cope with this challenge.

The same process happened again when we arrived in South Africa. We had to include two new members in the group. Their perception on the workload was very different from us and the situation was problematic until we arrived in the villages. On the second day, it was clear that we were working in two different directions. We decided together to open a dialogue with the South African counterparts to discuss to improve the situation. This discussion resulted in better group dynamics and a more homogenous work.

6.3 Research limitations

The major limitation of our research study is the time. To some extent the time reduces the quality of our research as we could not get certain detail information. For example, we could only make the trend analysis of the availability of medicinal plants in general but not for some specific species.

Availability of and accessibility to the targeted informants are also major constraints. For instance, on one hand, we could not get in-depth information because the informants did not had no more time for us and on the other hand, they did not want to meet us like the case of the Sangoma in Pepela who stayed away from Pepela because of us.

More activities would have been achieved if our counterparts had been well prepared when we arrived in South Africa. We have spent much time with them to work on a synopsis.

VII Conclusion/perspectives

(Responsible authors: Fuyun Lieu, Jesper Vind, Parichart Promchote, Proyuth LY)

Many species of medicinal plants which are easily accessible to the community, are available in the research area and are widely distributed. The current gathering of medicinal plants by the community, which is only for home consumption, is likely less harmful to the resources. The medicinal plants in the research area were exploited for commercial purpose from 1968 to 2004 but at (on a) small scale from 1968 to 2002. Large-scale gatherings were observed between 2002 and 2004. The resource distribution has changed with the possible increase in availability from 2004 since when the commercial gathering was forbidden.

The villagers are allowed only to collect for their own use, thus they do not have any income from the medicinal plants except healers generating the small income through medical services and hawkers making money through the sale of medicinal plants in the district centers. The medicinal plants have an important role in the primary health care system for the local people with up to 95% of households surveyed use indigenous medicines. Furthermore, it has cultural value giving it the power that Western medicine does not have. However, medicinal plants are not totally panacea. For some serious illnesses such as TB, HIV/AIDS, hypertension and diabetes, the use of traditional medicines at the same time with western medicines results in worse health condition and shorter life time expectancy for the patients.

The general medical situation has to be understood through South African history that the black people had not been allowed to get access to western medicines before 1994 and the contact between western and traditional medicines is quite new. Even though the Ministry of Health and the Traditional Healer Organization are trying to integrate the two medical practices, there are still difficulties that have to be overcome. We believe that more Inyangas and Sangomas will have to receive training and get certificate in their skill and knowledge.

The rules of medicinal plants are being effectively applied in the research area even though these rules are not written and have just recently been enforced. The rules are effective because the local community has the perception that the commercial gatherers are outsiders that come to steal their resources. A threat to the medicinal plant availability in the research area is that the local community believes that medicinal plants will not run out. This

perception might result in “The Tragedy of Common”. Another factor which is believed to have a strong negative effect on the medicinal plants is wattle spread. It could be taken into consideration that a research team conducts a study on the effect of wattle spread on the availability of medicinal plants and make an economic analysis to make an overall management plan for their resources.

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Appendix

Appendix 1: Medicinal plants mentioned in the study area that could not identify botanical name

No.	Local name	Part use	Propose of use in the research area	Plant availability and harvesting	Plant name mentioned from
1.	glerula	no data record	Use during pregnancy	no data record	questionnaire, cultivated
2.	gum tree	no data record	Treating cough	no data record	
3.	icham	no data record	Treating breathing (asthmatic), and use to treat disease for cows	available during Dec-Jan, very rarely to find	interviews
4.	ilimilenkomo	no data record	Treating itchy skin	available all seasons, can find around the village	interviews
5.	inqwebeba	no data record	Used to protect evil spirit	can not find in Papela and not available in winter	cultivated
6.	isakhonkunane esiboun	Root	Cleaning intestine	dig some parts of root, available all seasons, and easy to find	field walk-Sangoma
7.	isifulathela	Root	Releasing sharp pain	dig whole plant, available all seasons and easy to find	field walk-Sangoma
8.	isirwece	Root	Healing someone to be Sangoma (by drinking/washing)	collect branch and leaves, a lot in the mountain, available in summer and easy to find	field walk-Sangoma, interviews
9.	isivuthevuthe	no data record	Treating fever	no data record	questionnaire, cultivated
10.	iswelena	no data record	no data record	no data record	interviews, cultivated
11.	magageni	bulb and root	Protecting evil spirit (mix with water and take a bath)	available in Nov/Dec, difficult to find on winter	field walk-Inyanga'son, interviews, cultivated
12.	maherisake	no data record	no data record	no data record	interviews
13.	mkupa	no data record	protecting from bad luck	no data record	questionnaire
14.	mridili	no data record	no data record	no data record	PRA-collectors, interviews
15.	mthomyana	no data record	no data record	no data record	interviews
16.	ngcengwane	bulbs	Cceaning child stomach	dig whole plant, easy to find but only in summer	field walk-Sangoma
17.	phaphamisa	no data record	treating ear pain and diarrhoea	no data record	questionnaire
18.	phathangaka	no data record	treating cough	no data record	questionnaire
19.	rasin	root	cleaning when have child born	dig only root, available all seasons, and easy to find	field walk-Sangoma
20.	sixhotyeni	no data record	no data record	no data record	cultivated
21.	tywalabentata	no data record	treating stomach ache	no data record	questionnaire
22.	umasimini	no data record	cleaning stomach and for vomiting	no data record	questionnaire
23.	umsilengwo	no data record	treating diarrhoea	can find in the mountains and around village but not available in winter	PRA – collectors, interviews
24.	phunyuka-bempethe	no data record	no data record	no data record	PRA-Inyanga
25.	ungcana	no data record	use for vomiting	no data record	questionnaire
26.	vimbi-ikhalo	no data record	no data record	no data record	PRA-Inyanga
27.	vezalana	no data record	use for better health	no data record	questionnaire

Appendix 2: Scoring and ranking of medicinal plants according to frequent use and importance

Botanical name	Local name	Frequency of use					Importance
		R. 1	R. 2	R. 3	Average	Ranking	
Eucomis autumnalis	Umathunga	3	6	8	5.7	3	14
Alepidea amatymbica	Ikhathazo	5	13	7	8.3	1	9
	Amanzi-Amnyama	3	7	0	3.3	7	9
Pimpinella caffra/Scabiosa columbaria	Ibheka	3	0	8	3.7	6	6
Helinus integrifolius	Ubhubhubhu	3	8	8	6.3	2	0
Tulbaghia spp.	Umwelela	8	6	0	4.7	4	0
Pentanisia prunelloides	Icimamlilo	5	0	8	4.3	5	0
Rhoicissus tridentata, R. digitata	Isinwazi	5	0	0	1.7	8	0
	Mridili	5	0	0	1.7	8	0

Appendix 3: Questionnaire for household survey

Questionnaire **Code…….**

1. General information

Village: □ M □ P Date: ……/03/07 Time: ……
Interviewer:……..
Name: …….. Age: ……. Gender: □ M □ F Household function……
Tribe: □ Sotho □ Xhosa □
Other…….
Household size…… Number of Male(s):……..... Female(s):……..

2. Economical impact

2.1 Does your family collect medicinal plants? □ Yes □ No (If not go to question 3.1)
2.2. Who usually collects medicinal plants? □ Father □ Mother □ Children □ Other……..……
2.3 Do you have income from medicinal plants? □ Yes □ No
2.4 What is your annual income from medicinal plants?
□ < 1000 R □ 1001-3000 R □ 3001-6000 R □ > 6000 R

2.5 What are the sources of your income and please rank according to its economical importance (1= less important)

Source of income	Rank

3. Medicinal plant use

3.1 Do you use indigenous medicine? □ Yes □ No
3.2 Please list the main indigenous medicine frequently used in your family and specify purpose of use

Indigenous medicine[16]		Main purpose of use
Use	Medicinal plant	
		□ Illness □ Better health □ Evil spirit protection □ For luck
		□ Illness □ Better health □ Evil spirit protection □ For luck
		□ Illness □ Better health □ Evil spirit protection □ For luck
		□ Illness □ Better health □ Evil spirit protection □ For luck
		□ Illness □ Better health □ Evil spirit protection □ For luck

16 amayeza

3.3 Impact of medicinal plant use on people health condition

Main disease	Solution	Reason	Outcome	Future use
	□ Western medicine □ Amayeza	□ Price □ Cultural value □ Accessibility □ Other…….	□ Good □ Some effect □ Bad	□ Yes □ No □ Don't know
	□ Western medicine □ Amayeza	□ Price □ Cultural value □ Accessibility □ Other…….	□ Good □ Some effect □ Bad	□ Yes □ No □ Don't know
	□ Western medicine □ Amayeza	□ Price □ Cultural value □ Accessibility □ Other…….	□ Good □ Some effect □ Bad	□ Yes □ No □ Don't know
	□ Western medicine □ Amayeza	□ Price □ Cultural value □ Accessibility □ Other…….	□ Good □ Some effect □ Bad	□ Yes □ No □ Don't know
	□ Western medicine □ Amayeza	□ Price □ Cultural value □ Accessibility □ Other…….	□ Good □ Some effect □ Bad	□ Yes □ No □ Don't know

4. Cultivation

4.1 Do you cultivate medicinal plants? □ Yes □ No (If not go to question 4.5)

4.2 If yes, what are the medicinal plants you cultivate?

Medicinal plants	Area	Reason for cultivation

4.5 Between wild amayeza & cultivated amayeza, which one would you choose to use?
□ Wild □ Cultivated □ Both.

Why: ……..…….

4.6 Do you know the management rule for medicinal plants?

□ Yes Can you tell us about it please?.....

□ No Why not..……

Appendix 4: Guideline for semi-structured interview with traditional healers

Personal information

1. Are you Inyanga or Sangoma?
2. How long have you been Inyanga/Sangoma?
3. How many Sangoma and Iyanga in Makomerenge and Papela and is the number change?
4. How long have you been collecting medicinal plants?

Distribution and availability of medicinal plant

1.Where do you collect the plants from?
2.Have you seen any change of collecting medicinal plants over the year?
3.What are the most frequently used species, purpose of use and its situations?
4.What is/are the species difficult to find?
5.Are there any seasonal variations in the availability of medicinal plants?

Situation of exploitation and harvesting technique

1.What is/are your techniques for collecting medicinal plant in general?
2.Do you know about commercial collectors?
3.Does it have conflict between healers and commercial collectors?
4.Have you noticed any commercial gatherers in the area?
5.Why don't you see commercial gatherers anymore? And why?
6.How were they stopped?
7.How do you know that the commercial collectors aren't still collecting here?
8.Do you collect tree bark to use in healing?
9.Do you know if any other sangomas in the area use tree bark?
10. Do you find that medicinal plants are running out and are becoming increasingly difficult to find?

Management rules and its situation

1.Do you know of any rules regarding the collection of medicinal plants?
2.What are the management rules for collecting medicinal plant (in your views)?
3.Who define these rules?
4.What do you think about those rules?
5.When these rules were defined and applied?

Health situation, economical, health and cultural impacts of medicinal plant on local people's livelihood

1.What are the main diseases in this area?
2.What are the main illnesses that you treat
3.Who are your clients?
4.How many patients do you treat per month?
5.Do you find that you have fewer patients now compared to in the past because many people prefer to go to the clinic to receive western medicine?
6.Do you have clients who infected by HIV?
7.Do people use indigenous and western medicines?
8.What is/are species increased because of high demand?
9.What do you think about trend of medicinal plant use over years?
10. Do you think there is a trend in increase or decrease of using indigenous medicines?
11. If yes, since when and why?

12. Do you ever find that you cannot treat a patient properly and then have to send them to the clinic?
13. Are there any diseases that you cannot cure?
14. Do you have income from medicinal plant and from treating people?
15. Do you have other sources of income
16. What is the most important of your income raking by economics?

Situation of cultivated medicinal plants

1.Do you grow medicinal plant, what is species, and why you grow it?
2.Are you interest to grow others species?
3.Do you think wild and cultivated medicinal plant has different effect?
4.What is/are species that you wants to grow?
5.Do you believe the species use for protect evil spirit has different effect between wild and cultivated?

Others factors affecting medicinal plant stock

1. What is/are other factors can affect medicinal plant stock (in your view)?
2. How do fire and overgrazing affect to medicinal plants?
3. Do you think that cattle are having an effect on the amount of medicinal plants?
4. Is there any management of where the cattle graze to prevent them from eating the medicinal plants?
5. Does the wattle have any effect on the abundance of the medicinal plants?
6. Are you concerned that as the wattle spreads there will be nowhere left for the medicinal plants to grow?

Appendix 5: Guideline for semi-structured interview with hawkers (street traders and warehouse's owner)

1. Where did you get medicinal plants from?
2. What is the situation of demand and supply of medicinal plants for trading?
3. Why people come to buy medicinal plants form you (in your opinion)?
4. How much of income you get form medicinal plants?
5. Do you have other sources of income
6. What is the most important of your income raking by economics?

Appendix 6: Guideline for semi-structured with staff nurse at Tayler Bequest Hospital in Matatiele

1. Does the hospital endorse the use of traditional medicine?
2. Does the hospital run any education programmes to teach the local people about HIV and AIDS?
3. Could you provide us with some statistics on the main illnesses treated here at the hospital?
4. Could you also provide information on the mortality rate in the area?
5. Is the mobile clinic able to go into the Eastern Cape?

Appendix 7: Guideline for semi-structured interview with head Matron at Maluti Health Clinic

1. How many patients do you treat here at the clinic every month?
2. How many staff do you have?
3. What kind of illnesses do people come to see you for?
4. Why are the numbers for males with HIV so much lower than those for females?
5. Do you find that the people that you treat here at the clinic use indigenous medicine as a treatment option?
6. What kind of illnesses or problems do your patients use both indigenous medicine and western medicines for?
7. Does the clinic endorse the use of traditional medicine and why?
8. Can you give any examples of this?
9. How do you think this situation could be improved?
10. Do you have any statistics on the child mortality rate in the area?
11. How often does the mobile clinic visit the Madlangala area?
12. Can you treat all illnesses with what is inside the mobile clinic?
13. What facilities do you have here at the clinic?
14. What do you do if a patient that you cannot sufficiently treat arrives?
15. Do you run any education programmes to educate the local people about HIV and AIDS?
16. How do the patients you treat pay for your services?
17. Is there other things that you think could be done to improve the health situation in the area?

Appendix 8: Guideline for focus group meeting

1.Timeline of medicinal plant exploitation and management rule

- When do management rules come into effect?
- Why the management rules on medicinal plant were introduced?
- What is situation of medicinal plant exploitation in the past and present?
- What does change in medicinal plant use and exploitation after year 1994?
- Which species of plants are now difficult to find?
- What is your perception on medicinal plant stock?
- Have any conflicts over resource use in the past and present?

2. Details on management rules

- What are details set in management rules?
- What are the rules regarding harvesting medicinal plants? And do villagers know how to harvest correctly?
- How to apply the management rules?
- Who is/are or should be allowed to collect medicinal plants? And do people need to ask permission to collect medicinal plants?
- What is area not allowed to harvest medicinal plants?

3. Others factors affect medicinal plant and management practices

- What is situation of land use that can affect medicinal plants?
- Do you think wattle spread and eradication of wattle affect medicinal plants?

- Do you find fire to be a problem for medicinal plants?
- Do you find grazing to be a problem for medicinal plants?
- Do you have management rule on other factors that can affect medicinal plants?

Appendix 9: Key informant name list

1) Traditional healers

1. Shadrack Sihlahla	Inyanga	Makomereng
2. Vuyiswa	Sangoma	Pepela
3. Mathiyane	Sangoma	Pepela
4. Mashyane	Inyanga	Mabua
5. Emily	Sangoma	Mabua

2) Management Committee (for focus group meeting)

Name	**Position**
1. Victoria	Chieftess
2. Shadrack Sihlahla	Member
3. Zengele Mnyameni	Additional member
4. Johannes Rarini	Sub-headman of chief
5. Alfred Nonkevu	Vice Chairman
6. Jackson Mngese	Additional member
7. Victor Spambo	Member of executive committee
8. Victoria Nobatina	Member
9. Bongani Ndwadwa	Member
10. Luka Magagene	Trustee of Pepela
11. Ashwell Mdleleni	Member
12. Lucas Magagene	Sub-headman of chief
13. Olga Spambo	Member
14. Emily Spambo	Member

3) Participants for PRA exercise in Pepela

1. Mziwoxolo Theophilus Kubani
2. Ellen Spambo
3. Dargracia Marareni
4. Sellina Ndwandwa
5. Mlamli Marareni

Appendix 10: Time schedule for field work and individual activity sheets

Overall activity sheet during field work

Date	Time	Activities	Done	Responsibility	Remark
Sat 03 Mar.	9:00-16:00	• Meeting with key informants • Make appointment with traditional healers in Makomereng and Pepela	√ √	• All • All	
Sun 04 Mar.	9:00-12:00	• Field walk with Iyanga's son (Mr.Ndiphile), including collect plant specimen, and GPS mapping	√	• All	
	13:00-14:00	• Pretest questionnaires in Makomereng	√	• All	
	14:00-15:00	• Discuss within group to revise questionnaire	√	• All	
	15:00-17:00	• Questionnaire survey in Makomerenge	X	• All	Time constraints
Mon 05 Mar.	9:00-12:00	• Semi-structured interview with Iyanga of Makomereng (Mr.Shadrack) and PRA exercises	√	• Proyuth, Parichart, Candice	
		• Questionnaire survey in Makomereng	√	• Jesper, Sarah, Fuyun	
	13:00-17:00	• Semi-structured interview with Sangoma of Pepela (Mrs.Mariya) and PRA exercises	X	• Jesper, Sarah, Fuyun	Sangoma was not at her house, changed to questionnaire survey in Pepela
		• Questionnaire survey in Pepela	√	• Proyuth, Parichart, Candice	
Tue 06 Mar.	7:00-12:00	• Field walk with Mrs.Vuyiswa (Sangoma of Pepela), including collect plant specimen and GPS mapping	√	• All	
	13:00-15:00	• Seme-structured interview with Mathiyane, Sangoma of Pepela	√	• Sarah, Candice, Fuyun	
	14:00-16:30	• Seme-structured interview with Mrs. Vuyiswa, Pepela	√	• Jesper, Proyuth, Parichart	
	15:00-16:30	• Questionnaire survey in Pepela	X	• All	Time constraints
Wed 07 Mar.	9:00-12:00	• Questionnaire survey in Makomereng	√	• All	Separate into two groups for working
	13:00-16:30	• Questionnaire survey in Pepela	√	• Sarah, Candice, Parichart	
	14:30-16:30	• Semi-structured interview with chief and focus group with management team in Pepela	X	• Jesper, Proyuth, Fuyun	Chief was not available and appointment was cancelled. Changed to questionnaire survey

Date	Time	Activities	Done	Responsibility	Remark
Thru 08 Mar.	9:00-16:30	• Visit health clinic in Matatiele and apply semi-structured interview	√	• Jesper, Sarah, Candice	
		• Questionnaire survey in Pepela	√	• Parichart, Proyuth, Fuyun	
Fri 09 Mar.	9:00-12:00	• Debriefing what we have done and what we are going to do	√	• All	
	13:00-15:00	• Preparation for focus group discussion with management team	√	• All	
	15:00-16:30	• Preparation for presentation	√	• Jesper, Sarah, Candice, Fuyun	
		• Make appointment with collectors in Makomereng	√	• Proyuth, Parichart	
Sat 10 Mar.	9:00-12:00	• Seme-strutured interview with Sangoma in Mabua village	√	• Jesper, Sarah, Candice	
		• Make appointment with collectors in Pepela	√	• Proyuth, Fuyun, Parichart	
	14:00-17:00	• Try a new method to measure abundance of medicinal plant	√	• All	Pepela's mountains
Sun 11 Mar.	9:00-12:00	• Focus group with chief and management team in Pepela	√	• Jesper, Sarah, Candice, Fuyun	
	9:00-11.00	• Participatory mapping with Mr.Shadrack (Iyanga of Makomereng) and his son (Mr.Ndiphile)	√	• Proyuth, Parichart	
	11.00:12:00	• Make appointment with collectors in Makomoereng	√	• Proyuth, Parichart	
	13:00-16.30	• Succor game	X	• All	Heavy rain
Mon 12 Mar.	9:00-12:00	• Semi-structured interview with informal traders and ware house owner in Matatiele	√	• Sarah, Candice	
		• PRA exercise with collectors, Pepela	√	• Proyuth, Fuyun, Parichart	
	13.00-18.00	• Barbecue? • Community meeting and presentation of preliminary finding	√	• All	

Activity sheet (Jesper Vind)

Date	Time	Activities
Sat 03 Mar.	09:00-16:00	• Meeting with key informants • Make appointment with traditional healers in Makomereng and Pepela
	20.00-23.45	• Re-writing field notes
Sun 04 Mar.	9:00-12:00	• Field walk with Inyanga's son (Mr.Ndiphile), including collect plant specimen and observe harvesting techniques
	13:00-14:00	• Pretest questionnaires in Makomereng
	14:00-15:00	• Discuss within group to revise questionnaire
	15:00-17:00	• Storage plant samples from field walk and preliminary identification
	20.00-23.45	• Re-writing field notes
Mon 05 Mar.	09:00-12:00	• Questionnaire survey in Makomereng
	13.00-17.00	• Semi-structured interview and PRA exercises with Sangoma of Pepela (Mrs.Mariya)
	20.00-23.45	• Re-writing field notes
Tue 06 Mar.	07:00-12:00	• Field walk with Mrs.Vuyiswa (Sangoma in Pepela), inc. collecting plant specimen and observe harvesting techniques
	14:00-16:30	• Semi-structured interview with Mrs.Vuyiswa (Sangoma in Pepela) and PRA exercises (trend analysis and seasonal calendar)
	16:30-18.00	• Questionnaire survey in Pepela
	20.00-23.45	• Re-writing field notes
Wed 07 Mar.	09:00-12:00	• Questionnaire survey in Makomereng
	14:30-16:30	• Semi-structured interview with chief and focus group with management team in Pepela
	20.00-23.45	• Re-writing field notes
Thru 08 Mar.	09:00-16.30	• Visit health clinic in Matatial and apply semi-structured interview
	17.00-18.00	• Walk with interpreter to see old house in Pepela were commercial gatherers lived in the past.
	20.00-23.45	• Re-writing field notes
Fri 09 Mar.	09:00-12:00	• Debriefing what we have done and what we are going to do with group members
	13:00-15:00	• Preparation for focus group discussion with management team
	15:00-16:30	• Preparation for presentation
	20.00-23.45	• Re-writing field notes
Sat 10 Mar.	09:00-12:00	• Semi-structured interview with Inyanga & Sangoma in Mabua village
	14:00-17:00	• Try a new method to measure abundance of medicinal plants by temporary sampling plot
	20.00-23.45	• Re-writing field notes
Sun 11 Mar.	09:00-12.00	• Focus group meeting with management team in Pepela
	11.00: 16.30	• Heavy Rain
	13:00-16.30	• Re-writing field notes from Saturday
	20.00-23.45	• Re-writing field notes
Mon 12 Mar.	09:00-15.00	• Collecting cars from rental service with Andreas, Torben and Trevor.
	15.00-18.00	• Barbecue? • Community meeting and presentation of preliminary finding
	20.00-23.45	• Re-writing field notes

Activities sheet (Parichart Promchote)

Date	Time	Activities
Sat 03 Mar.	09:00-16:00	• Meeting with key informants • Make appointment with traditional healers in Makomereng and Pepela
Sun 04 Mar.	9:00-12:00	• Field walk with Inyanga's son (Mr.Ndiphile), including collect plant specimen and observe harvesting techniques
	13:00-14:00	• Pretest questionnaires in Makomereng
	14:00-15:00	• Discuss within group to revise questionnaire
	15:00-17:00	• Storage plant samples from field walk and preliminary identification
Mon 05 Mar.	09:00-12:00	• Semi-structured interview with Inyanga in Makomereng (Mr.Shadrack) and PRA exercises (trend analysis and seasonal calendar)
	13.00-17.00	• Questionnaire survey in Pepela
Tue 06 Mar.	07:00-12:00	• Field walk with Mrs.Vuyiswa (Sangoma in Pepela), including collect plant specimen and observe harvesting techniques
	13:00-14:00	• Storage plant samples from field walk and preliminary identification
	14:00-16:30	• Semi-structured interview with Mrs.Vuyiswa (Sangoma in Pepela) and PRA exercises (trend analysis and seasonal calendar)
Wed 07 Mar.	09:00-12:00	• Questionnaire survey in Makomereng
	13:00-16:30	• Questionnaire survey in Pepela
Thru 08 Mar.	09:00-12.00	• Questionnaire survey in Makomereng
	13.00-16.30	• Questionnaire survey in Pepela
Fri 09 Mar.	09:00-12:00	• Debriefing what we have done and what we are going to do with group members
	13:00-15:00	• Preparation for focus group discussion with management team
	15:00-16:30	• Make appointment with collectors in Makomereng
Sat 10 Mar.	09:00-12:00	• Make appointment with collectors in Pepela
	14:00-17:00	• Try a new method to measure abundance of medicinal plants by temporary sampling plot
Sun 11 Mar.	09:00-11.00	• Participatory mapping of medicinal plant distribution in Makomereng area with Mr.Shadrack (Inyanga in Makomereng) and his son (Mr.Ndiphile)
	11.00:12:00	• Make appointment with collectors in Makomereng
	13:00-16.30	• Preparation for PRA with collectors • Identification medicinal plants with interpreters
Mon 12 Mar.	09:00-12.00	• PRA exercise with collectors, Pepela. Ranking and scoring of most frequently use and important species, and participatory mapping of medicinal plant availability in Pepela area were done
	13.00-18.00	• Preparation for presentation • Community meeting and presentation of preliminary finding

Activities sheet (Proyuth LY)

Date	Time	Activities
Sat 03 Mar.	09:00-16:00	• Meeting with key informants • Make appointment with traditional healers in Makomereng and Pepela
Sun 04 Mar.	09:00-12:00	• Field walk with Inyanga's son (Mr. Ndiphile), collect plant specimen, and GPS mapping
	13:00-14:00	• Pretest questionnaire in Makomereng
	14:00-15:00	• Discuss within group to revise questionnaire
Mon 05 Mar.	09:00-12:00	• Semi-structured interview with Inyanga in Makomereng (Mr. Shadrack) and PRA exercises
	13:00-17:00	• Questionnaire survey in Pepela
Tue 06 Mar.	07:00-12:00	• Field walk with Sangoma in Pepela (Mrs.Vuyiswa), collect plant specimen and GPS mapping
	14:00-16:30	• Semi-structured interview with Sangoma in Pepela (Mrs. Vuyiswa)
Wed 07 Mar.	09:00-12:00	• Questionnaire survey in Makomereng
	16:00-17:00	• Questionnaire survey in Pepela
Thru 08 Mar.	09:00-16:30	• Questionnaire survey in Pepela
Fri 09 Mar.	09:00-12:00	• Debriefing within group members what has been done and what is going to be done in the upcoming days
	13:00-15:00	• Preparation for focus group meeting with management team
	15:00-16:30	• Make appointment with collectors in Makomereng for PRA exercises
Sat 10 Mar.	09:00-12:00	• Make appointment with collectors in Pepela for PRA exercises
	14:00-17:00	• Try a new method to measure the abundance of medicinal plants in Pepela mountains
Sun 11 Mar.	09:00-11.00	• Participatory mapping with Inyanga (Mr.Shadrack) and his son (Mr.Ndiphile) in Makomereng
	11.00:12:00	• Make appointment with collectors in Makomereng PRA exercises
	13:00-16.30	• Soccer game in Mabua (cancelled because of heavy rain)
Mon 12 Mar.	09:00-12:00	• PRA exercise with collectors in Pepela
	13.00-18.00	• Barbecue • Community meeting and presentation of preliminary findings

Activity sheet (Fuyun Liu)

Date	Time	Activities
Sat 03 Mar.	09:00-16:00	• Meet with key informants • Make appointment with traditional healers in Makomereng and Pepela
Sun 04 Mar.	09:00-12:00	• Field walk with Inyanga's son, including collect plant specimen, take photo of medicinal plants and observe harvesting techniques
	13:00-14:00	• Pretest questionnaires in Makomereng
	14:00-15:00	• Discuss within group and revise questionnaire
	15:00-17:00	• Check plant samples from field walk and try to identify their Latin name
Mon 05 Mar.	09:00-12:00	• Conduct questionnaire survey in Makomereng
	13.00-17.00	• Continue questionnaire survey in Pepela
Tue 06 Mar.	07:00-12:00	• Field walk with Samgoma in Pepela, including collect plant specimen, take photos and GPS mapping
	13:00-16:30	• Carry out Semi-structured interview with Sangoma of Pepela
Wed 07 Mar.	09:00-12:00	• Conduct questionnaire survey in Makomereng
	13:00-16:30	• Continue to conduct questionnaire survey in Pepela
Thru 08 Mar.	09:00-12.00	• Conduct to questionnaire survey in Makomereng
	13.00-16.30	• Finish questionnaire survey in Pepela
Fri 09 Mar.	09:00-12:00	• Assist debrief work.
	13:00-15:00	• Prepare for focus group discussion with management team
	15:00-16:30	• Make appointment with collectors in Makomereng
Sat 10 Mar.	09:00-12:00	• Sort out the highest mentioned medicinal plants in questionnaire survey
	14:00-17:00	• Go to the mountain to try a quadrate sample exercise.
Sun 11 Mar.	09:00-12:00	• Implement focus group discussion with chief and management team in Pepela
	13.00:16:30	• Discuss within group for data collection
Mon 12 Mar.	09:00-12.00	• PRA exercise with collectors, Pepela.
	13.00-18.00	• Meet in Madlangala Chalet and summary at village level

Appendix 11: Synopsis

Final Synopsis

Medicinal plants, its Condition and Socio Economic Impacts: A Case Study in Makomereng and Pepela, South Africa

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I. Background

Indigenous medicine is widely used in South Africa. Mander (1997) estimated that around 27 million South Africans use indigenous medicines, of which 6 to 7 million black people are residing in the province of KwaZulu-Natal. It is reported that there are over 100 000 indigenous healing practitioners in South Africa (Gericke pers. comm. 1996). Volumes sold are very difficult to estimate because of a lack of records and the often illicit nature of trade. However, Mander (1998) estimated in 1996 that approximately 20 000 tonnes of medicinal plants were consumed in South Africa annually, valued at approximately R 270 million (≈US$ 60 million at the time of the study). The rural poor are major stakeholders in the medicinal plant trade, particularly women and sectors of the community with limited alternative income generating opportunities (Cunningham 1991; Mander 1998).

The traditional medicines are used for different purposes. It is considered complementary to western medicines for treating physical condition, used for enhancing well-being and cultural purposes such as to ward off evil spirits and bring good luck (Cocks and V. Møller 2002; Cunningham 1992). It is also locally believed that the traditional medicines can heal HIV/AIDS.

Increasing demand for medicinal plants resulted in an increased pressure on wild plants as most of the plants traded in South African markets are observed to be harvested from wild population and are not cultivated.

Several factors have stimulated the increased demand:

- Rapidly growing and urbanizing Black population (80% consult traditional healers).
- Affordability, Accessibility and acceptability of traditional medicine over western medicine
- High rate of unemployment.
- Low level of formal education, especially in rural areas
- HIV/AIDS pandemic in the area increases demand for indigenous medicine.
- Growing international demand for South African medicinal products.

Mander (1998) argues that the above reasons are likely to increase the demand for indigenous medicine products in South Africa in the future.

We hope that a good understanding of the current status of resource distribution and medicinal plant use at the local level, medicinal plants importance on local people's livelihood and people's perception of management of medicinal plants, would allow us to come up with recommendations for better management of the resources to ensure both the biodiversity conservation and development.

II. Objectives and research questions

2.1 Objective

2.1.1 Overall objective

To understand the condition of medicinal plants and its socio economic impacts on local people in Makomereng and Pepela, South Africa.

2.2.2 Sub-objectives:

1) To investigate the situation of resource distribution and prevalent use of medicinal plants in Makomereng and Pepela, South Africa.

2) To investigate the economical, health and cultural impacts of medicinal plants on local people's livelihood.

3) To understand management rules, perceptions on practices and perspectives over the resource utilization.

2.2 Research questions

1) Is there any change of the medicinal plant resource distribution?

2) How was/is the medicinal plant resource exploited in the past and now?

3) How are the economical, health and cultural impacts of medicinal plants on local people's livelihood?

4) How are the health situation and the increase in population affecting medicinal plant use?

5) What are management rules, perceptions on practices and perspectives over the resource utilization?

6) What are the other factors affecting medicinal plant stock?

III. A conceptual framework of the research

We want to make a comparative analysis of the environmental situation and socio-economic impacts, created from trade in medicinal plants. Environment and socio-economic create supply and demand that create curtain opportunities (+) and constraints (-). Environment plays the role as provider of resource and the availability of medicinal plants depend on the management practices, for instance, commercial gatherers may maximize their benefits leading to over harvesting while traditional collectors may treat environment with more respect (see Figure.1)

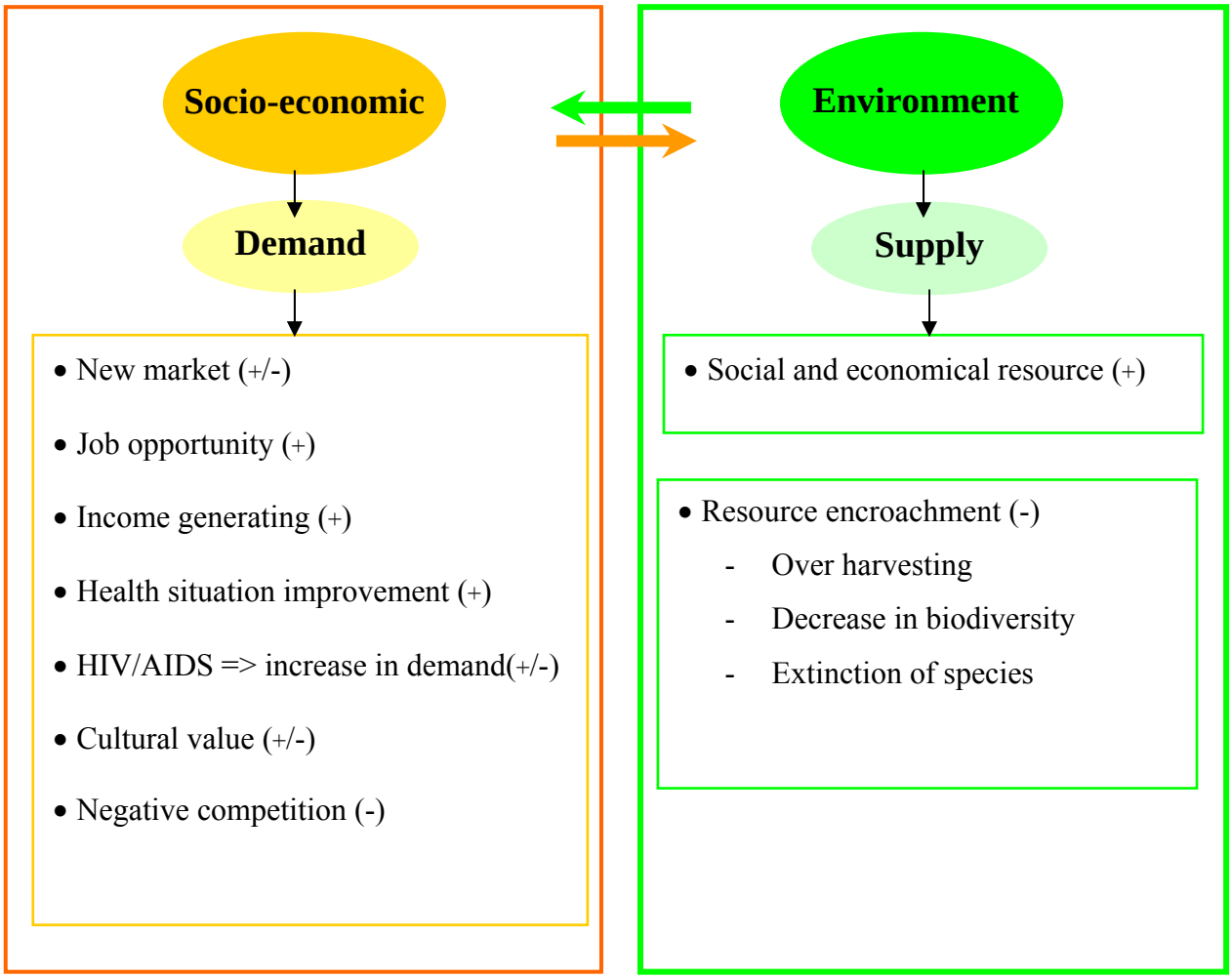

Figure 14: comparative analysis of the environmental situation and socio-economic impacts, created from trade in medicinal plants

Based on our own view[17], the current situation of environment, socio-economic and management related to medicinal plants at present is not in balance with each other. To make a positive utilization, interlink among the three components all has to have a positive effect on each other.

- Environment creates positive effects on socio-economic by adding value (+), as shown in Fig.1. On the other hand the socio-economic puts pressure on the environment (-).
- The demand created by the socio-economic make it feasible for commercial gatherers to use harmful management methods (-). Reversely, the socio-economic is negatively affected by the inappropriate management practices (-).
- Taking into account that management practices of medicinal plants are not the same between traditional and commercial gatherers, it is our assumption that the general management at present is harmful to the environment (-). As the supply of medicinal plants from the environment can not response to the demand, e.g. commercial gatherers maximize extraction, it results in destructive competition in the management level (-).

To understand the current situation we use figure.2 as a tool to pinpoint the major bottlenecks in the research area.

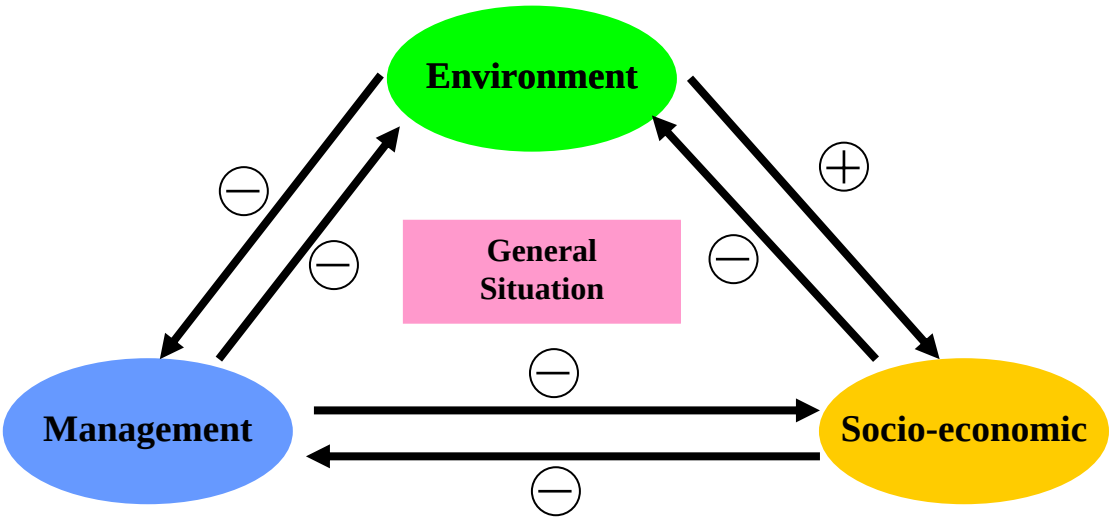

Figure 15: Interlink between environment, socio-economic and management

[17] Based on the knowledge that we got from the literature

IV. Methodology

4.1 Research location

The research will be conducted in the villages of Makomereng, Pepela and Durban city. Because medicinal plant utilization is not only concentrated at the village level, we expand our research area to include Durban.

4.2 Research design

To achieve the research objectives, the research design is prepared as illustrated in Table 1. It lists the objectives, the data required, the source of data, and the methods and tools to collect the data.

Table 7: Research design

Objective	Question	Data required	Source of data	Data collection methods
To investigate the situation of resource distribution and prevalent use of medicinal plants in Makomereng and Pepela, South Africa.	Is there any change of the medicinal plant resource distribution?	- Area distribution of medicinal plants/resource map	- Collectors, healers, hawkers - Fields	- Participatory mapping - Field walk and GPS mapping
		- Trend in medicinal plants availability	- Collectors, healers, hawkers Hawker	- Trend analysis
		- Species lists of medicinal plants	- Collectors, healers, hawkers - Fields	- Group discussion - Plant specimens
		- Lists of scarce species and most preferable species	- Collectors, healers, hawkers Villagers	- Matrix ranking/scoring
		- Density (shoots/area)of scarce species (top lists at least 3 species)	- Specific fields where medicinal plants available	- Temporary sampling plot
		- Botanical characteristics of scare species	- Secondary data	- Literature review
	How was/is the medicinal plant resource exploited in the past and now?	- Number of collectors, (commercial & traditional gatherers), healers & hawkers	- Key informants	- Semi-structure interview
		- Harvesting techniques in the past and present	- Collectors, healers, hawkers Fields where medicinal plant be gathered	- Group discussion - Field visit and direct observation
		- Harvesting calendar	- Collectors, healers, hawkers	- Seasonal calendar

Objective	Question	Data required	Source of data	Data collection methods
To investigate the economical, health and cultural impacts of medicinal plants on local people's livelihood	How are the economical, health and cultural impacts of medicinal plants on local people's livelihood?	- Incomes from medicinal plant - % of income from medicinal plants compared to total household income - Personal perception of importance of medicinal plant income.	- Collectors - Healers, hawkers	- Questionnaire - Semi-structured interview - Ranking and scoring exercise
		- Impact of medicinal plant use on people health condition	- Secondary data - Villagers	- Data review - Questionnaire and in-depth interview
		- Objective for medicinal plant use (illness, protecting spirit, etc.)	- Villagers - Healers	- Questionnaire - Semi-structured interview
	How are the health situation and the increase in population affecting medicinal plant use?	- Number of people infected with HIV	- Healthcare center - Traders (if possible?) - Healers (if possible?) - Secondary data	- Semi-structured interview - Data review
		- Number increase in population	- Secondary data	- Data review
		- Main local diseases	- Healers	- Semi-structured interviews
		- Increased use of species because of health situation	- Healers	- Semi-structured interviews

Objective	Question	Data required	Source of data	Data collection methods
To understand management rules, perceptions on practices and perspectives over the resource utilization	What are management rules, perceptions on practices and perspectives over the resource utilization?	- Who is/should be allowed to collect medicinal plant	- Villagers, collectors, healers	- Group discussion
		- What are the property rights and access rules to medicinal plants.	- Villagers, collectors, healers	- Group discussion
		- Conflict over resource uses	- Villagers, collectors, healers	- Group discussion
		- Perception on wild and cultivated medicinal plants	- Villagers, collectors - Healers, traders	- Questionnaire - Semi-structured interview and participant observation
		- Status of current domestication and cultivation of medicinal plant	- Villagers, collectors - Healers - Home garden	- Questionnaire - Semi-structured interview and - Field walk& irect observation
	What are the other factors affecting medicinal plant stock?	- Situation of land use effects (burning, grazing, cropping)	- Collectors, healers, hawkers - Fields where medicinal plant be found	- Group discussion and semi-structured interview - Field visit&direct observation
		- Solution to situation of land use effects	- Collectors, healers, hawkers and villagers	- Group discussion and semi-structured interview

4.3 Methods

4.2.1. Sampling

Target populations for our research are traders, hawkers, healers, commercial gatherers, traditional gatherers, villagers. Sampling technique and sampling sizes will be chosen upon arrival in research area once we have enough information.

4.2.2 Documentary research and secondary sources

The whole group did a literature search 7th of February, and came up with 21 relevant articles, papers and reports. To get knowledge about the botanical characteristics of the medicinal plant species in the area, we also found 29 articles about plant species in the Makomereng & Pepela area. We also make documentary research to find quantitative information about the number of HIV/AIDS infected people in the research area, and information about population growth.

4.2.3 Social survey

4.2.3.1 Questionnaire

Because our research time is so limited we need to get qualitative and quantitative answers and information fast. A way to do this is to create useful and well prepared questionnaires that can give a fast and somewhat precise image of the situation in the research are, in an early stage of the research.

Questionnaire is applied with villagers and collectors to make generalization on income, impact of medicinal plant use on health, objective for medicinal plants use, perception on wild and cultivated medicinal plant use, status of current domestication and cultivation of medicinal plants.

4.2.3.2 Semi-structured interview and in-depth interview

We need more precise answers to some of the questions, and need to do more in-depth interviews and research with some of the key informants.

The information on number of collectors, (commercial & traditional gatherers), healers and hawkers can be extracted from key informants. The semi-structure interview will be also conducted with collectors, healers and hawkers in order to gather some information regarding

number of people infected with HIV, main local diseases, increased use of species because of health situation, objective for medicinal plant use, perception on wild and cultivated medicinal plant use, status of current domestication and cultivation of medicinal plant and income from medicinal plants.

4.2.4 Participatory rural appraisal (PRA)

4.2.4.1 Field walks and GPS mapping

To "Paint" an image of the biodiversity situation in the research area, we will try to cover an area as big as possible to see and map where and to what extend the medicinal plants are presented. This field walk will be conducted with key informants with special knowledge on the medicinal plants.

4.2.4.2 Participatory mapping

To make a comparative analysis of the past and present biodiversity situation, we need help from local collectors, healers and hawkers. Because we have not been in the research area before, it is needed to say that we have no comparisons to the present biodiversity situation. To get this we will try to get this by using the "Participatory mapping technique". We hope that the local collectors, healers and hawkers can give us some idea of the biodiversity changes that have happened in the area in the past 5 to 10 years. We would like to use a check up technique to see if the informants have actual knowledge about the research area. We use plant sampling and GPS mapping for cross checking.

4.2.4.3 Participant observation/direct observation

The participant observation and direct observation is conducted during the whole research process for cross-checking the data acquired. As we will arrive in Durban, direct observation will be carried out in Durban markets to get an idea of the flow and sale of the medicinal plants.

4.2.4.4 Trend analysis

We use trend analysis to understand rough overviews of the changes in medicinal plant endowments over the past 10 years. This trend analysis will be organized with collectors, healers and hawkers.

4.2.4.5 Matrix raking/scoring

Our research area has between 500-1000 medicinal plants, and to narrow our focus of research down to a size that we can cope with, we hope that we can find 5-6 main species identified according to its importance in term of economical and cultural[18] value, health and scarcity[19]. The method for this selection will be done through a ranking and scoring exercise with villagers, collectors, healers and hawkers. If significant different views between these groups of people are observed, the importance of medicinal plants is classified according to each category of people. This method is also used to know the perception of collectors, healers and hawkers on the importance of medicinal plant income.

4.2.4.6 Group discussion

The group discussion will be used in order to identify species. It is also a session where we can know more about the harvesting techniques used by different groups of gatherers, namely commercial and traditional gatherers and healers in the research area and to see whether the harvesters know if harvesting techniques are harmful or not to the environment.

This method will allow us to understand the management rules, perception on practices and perspective over the resource management from villagers, collectors and healers. Situation of land use effects (burning, grazing, cropping), solution to situation of land use effects will be explored from this group discussion.

4.2.4.7 Seasonal calendar

This tool is used to know the seasonal gathering of different selected species. It will allow us to know if this gathering time affects on the regeneration of species.

4.2.5 Plant sampling

4.2.5.1 Plant specimens

Medicinal plant specimens are collected and tagged to identify species during participant field walk with key informants/healers. Harvesting techniques and parts of harvesting are recorded.

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[18] Protection from evil spirit, bringing luckiness etc.

[19] Scarcity in this case is when key informants think species are difficult to find.

4.2.5.2 Temporary sampling plot

Temporary sampling is applied in the specific sites of scacre medicinal plants habitat. At least twenty-five randomly placed 1 m^2 quadrats is sampled per plot site. Plot size varied according to the distribution of the target species. The GPS mapping is also applied to locate the sampling sites. Only target medicinal plants occurring in each quadrat are counted and density is calculated for each species. Data for these plants are recorded in terms of shoots per ha rather than plants per ha. Due to some rhizomatous or tuberous plants are difficult to separate into individuals as numerous shoots may sprout from an underground stem.

V. Time schedule

Table 8: Overall time schedule of research study

Period	Location	Activities
6th Feb.-16th Feb.	KU, DK	Literature review, Elaboration of synopsis
16th Feb.	Campusnet, KU	Submitting draft synopsis
19th Feb.	RUC, DK	Presentation of synopsis
19th Feb-22rd Feb	KU, DK	Revising synopsis and submitting final synopsis
8th Feb-28th Feb.	KU, DK & UKN, SA	Discussion and elaboration of synopsis with partner from South Africa
28th Feb. - 15th Mar.	Makomereng & Pepela, SA	Data collection and field work
22 nd Mar.- 9th April	KU, DK	Data processing and analysis, report writing
19th April	Campusnet, KU	Submitting report

Table 9: Time schedule of field work

Activities	Location	February						March																
		23	24	25	26	27	28	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
Arrival	Durban	x																						
Direct observation in Durban markets	Russel, Ezimbuzine		x																					
Preparation of final synopsis presentation	PMB			x																				
Presentation of final synopsis and feedback	PMB				x																			
Preparation for field work with SA students	PMB					x	x	x																
Travel to villages	Villages								x															
Meet key informants	Villages									x														
Semi-structure interview	Villages										x													
Questionnaire survey	Villages											x	x											
Participatory mapping, field walk and GPS mapping	Villages													x										
Ranking and scoring , group discussion	Villages														x	x								
Field walk and GPS mapping, plant sampling	Villages																x	x						
Presentation of finding to community and feedback	Villages																		x					
Departure from villages																				x				
Preliminary data analysis and finding	PMB																				x			
Preparation for presentation	PMB																					x		
Presentation	PMB																						x	

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