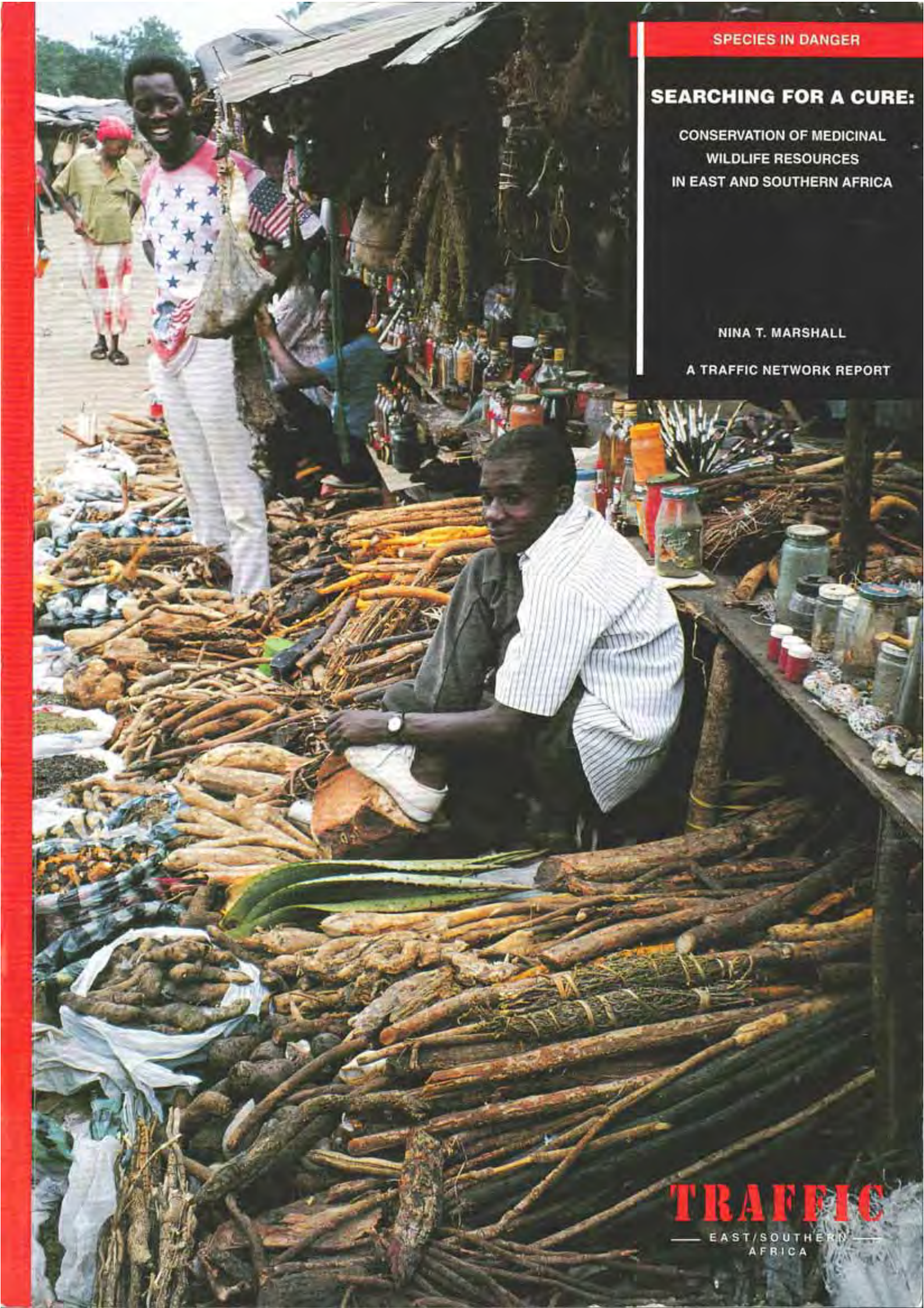

SPECIES IN DANGER

SEARCHING FOR A CURE:

CONSERVATION OF MEDICINAL WILDLIFE RESOURCES IN EAST AND SOUTHERN AFRICA

NINA T. MARSHALL

A TRAFFIC NETWORK REPORT

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Front cover photograph: Wildlife medicinals on sale in Maputo, Mozambique.

Photograph credit: Rob Barnett

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SEARCHING FOR A CURE: CONSERVATION OF MEDICINAL WILDLIFE RESOURCES IN EAST AND SOUTHERN AFRICA

by Nina T. Marshall

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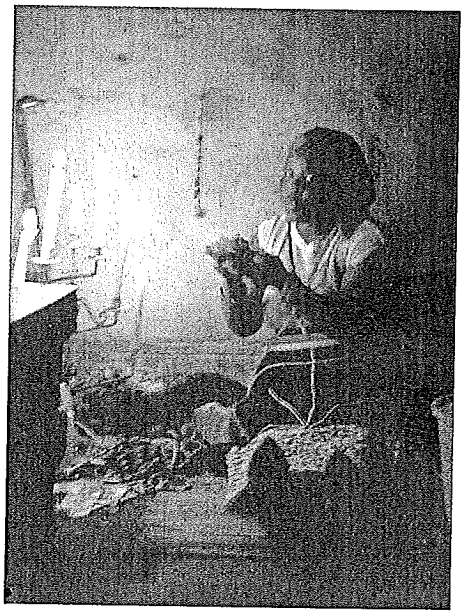

Credit: V.L. Williams, Department of Botany, University of the Witwatersrand

Traditional healer using smoking *Helichrysum* sp.

CONTENTS

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EXECUTIVE SUMMARY

It has been estimated by the World Health Organization that 80% of the world's population relies on traditional medicine to meet their daily health requirements (Akerele, 1993). In Africa, reliance on such medicine is partly owing to the high cost of conventional medicine and the inaccessibility of modern health care facilities, but also because traditional medicine is often deemed a more appropriate method of treatment. Materials used in traditional medicine in east and southern Africa include plants and animals, and to a lesser extent minerals, and the vast majority of wildlife used originates from the wild. In many areas, demand exceeds supply and, as human populations rise, habitat diminishes, and human impacts on ecosystems increase, it can be expected that pressure on medicinal resources will increase.

In 1996, TRAFFIC East/Southern Africa initiated an 18-month review of the trade in wildlife medicinals in east and southern Africa and Madagascar, with the aim of identifying species most in need of conservation, management and/or research attention. This review also entailed collecting information about trade patterns, markets, source areas, and impacts of harvest. Relevant information was collected in 17 countries: Botswana, Eritrea, Ethiopia, Kenya, Lesotho, Madagascar, Malawi, Mozambique, Namibia, Somalia, South Africa, Sudan, Swaziland, Tanzania, Uganda, Zambia and Zimbabwe.

This survey revealed that use of wildlife medicinals for local traditional medicinal purposes constitutes the most significant portion of the trade in medicines in the east and southern African region, although international trade does occur and includes a number of species produced and exported on a commercial basis. Over 100 indigenous plant species were identified as conservation or management priorities on a national basis. These plant species ranged from the exported Afromontane tree *Prunus africana*, to the Sudanese succulent *Aloe sinkatana*, valued locally to treat ailments such as skin problems and fever. Plant species were selected as conservation priorities if they had parts that were harvested in a destructive manner, and if they were either slow-growing, traded in large volumes, sold for a high price, or regarded as being scarce. Approximately 100 animal species were documented as being used in traditional medicine, and although trade information was less readily available for fauna, species were nonetheless prioritized as information on conservation status, distribution and threats is more widely available for fauna than it is for flora. A total of 29 animal species were listed as priorities for either conservation, management, or research, including Dugong *Dugong dugon*, African Wild Ass *Equus africanus*, and African Rock Python *Python sebae*.

While this survey revealed reports of increased scarcity for many plants and animals valued as medicines, these reports pertained not only to well-known endangered species such as the Green Turtle *Chelonia mydas* and Black Rhinoceros *Diceros bicornis*, but also to species regarded as widespread and common. In some cases these reports were restricted to the local or national level, but nevertheless represent a possible trend that should be addressed while supplies are still sizable. The Baobab *Adansonia digitata* has been identified as becoming scarce in Sudan and Eritrea, yet this large and conspicuous tree has a wide distribution across Africa, and occurs in large numbers in parts of its range. That this tree is declining in parts of its range is a local-level priority, but it could also be a signal for neighbouring countries to examine resource use more closely to avert future declines.

Solutions to the problem of increasing pressure and scarcity of wildlife medicinals can be addressed on a species-specific basis, but other approaches are necessary as well. In particular:

- Efforts must be made to collaborate with traditional healers' associations to promote propagation of endangered plant species and sustainable harvest techniques. The fact that traditional medicine is crucial

to the region's health care and is the dominant medical system in the region indicates that associations of traditional medicinal practitioners represent promising fora for education and awareness, and discussing and developing strategies to address the issue of declining medicinal resources.

- Demand for wildlife medicinals appears to be increasing and as it does so it will become necessary to increase the supply. Since the vast majority of wildlife medicinals are collected from the wild, where possible, efforts should be made to improve the status of threatened species through propagation or captive breeding, in order to supply the market with more medicinal materials, and to reduce the threat to populations remaining in the wild. For more common and widespread species, it is not practical to promote propagation and in these cases it would be more sensible to explore sustainable harvesting methods for target species. Key issues to be considered in this context are (i) how to promote the practice of sustainable harvesting methods, and (ii) how to address harvest methods when ownership rights require clarification. The options for establishing co-operatives aimed at sustainably harvesting wildlife medicinals could be examined, possibly modelled on community-based efforts already well-known in the region, such as Campfire. It will also be useful to assess the availability of medicinal by-products that are already produced as a result of, for example, ranching operations for the Ostrich and Nile Crocodile.

- Efforts to stabilize or protect the populations of some species through national legislation have in most cases been ineffective. Laws protecting animal species appear to be better known than those for plants, a feature which causes trade in animals to be covert in places. Plant laws were reported to be largely unknown by the majority of those interviewed for this study and, even where awareness existed, unregulated exploitation continued. In particular, this study has revealed that many individuals (and agencies) charged with regulation or implementation of legislation are unaware that medicinal products, and especially traditional medicinal products, are materials that should be subject to existing wildlife legislation and controls. Regulatory agencies should be made aware of the trade in wildlife medicinals, and its implications (such as declining populations and reduced medicinal security for the region as a whole), and their role in controlling it.

- There is still much that is not known about the wildlife medicinals trade and its impacts, and research will be required on many levels. Information on many species identified as being of medicinal value is lacking, particularly for plants. Data are deficient on status, and extent and impact of utilization, including for internationally traded plant species such as *Harpagophytum* spp., *Rauvolfia confertiflora, Prunus africana*, and *Drosera madagascariensis* and for some medicinal species used for non-medicinal purposes, such as *Pterocarpus angolensis*, *Boswellia papyrifera* and *Acacia senegal.* A botanical review of the priority plant species identified by this study is recommended, to ascertain relevant aspects of distribution, taxonomic uniqueness and chemical interest around the world and more surveys of the trade in animal medicinals are required in order to ascertain volumes traded and impact on populations. Reptiles, in particular tortoises and sea turtles, may be used in large quantities, but there is no information on species used, volumes traded, or the impact on the populations.

Failure to act to reverse the depletion, or stabilize the status, of wildlife medicinals in east and southern Africa will have not only a negative effect on the African environment, but also on the overall health status of the majority of people living in this region.

INTRODUCTION

In recent years much attention has been devoted to the medicinal use of high-profile fauna, such as rhinoceroses, bears and Tigers, the negative impact of such use on populations of these animals in the wild, and the resulting threatened status of these taxa. TRAFFIC East/Southern Africa recognized that while this concern is of crucial conservation importance, there are likely to be many other species in demand for medicinal purposes, and consequently in need of conservation attention. In early 1996 TRAFFIC East/Southern Africa initiated a review in 19 countries in the region, in order to gain an understanding of the trade in wildlife medicinals in east and southern Africa and Madagascar, and to identify those species most in need of conservation, management and/or research attention. The countries included in the review were: Angola, Botswana, Djibouti, Eritrea, Ethiopia, Kenya, Lesotho, Madagascar, Malawi, Mozambique, Namibia, Somalia, South Africa, Sudan, Swaziland, Tanzania, Uganda, Zambia and Zimbabwe.

This review entailed an examination of local and international trade in plants and animals used for medicinal purposes, to ascertain the species used, their source, trade patterns and volumes traded, conservation status and to the extent possible, the impact of harvest. Although 19 countries were originally included in the survey, insufficient information was found for Angola and Djibouti, and therefore these countries have been omitted from this report.

The breadth and scope of use of wildlife medicinals varies considerably from country to country in east and southern Africa, but there are several common themes that are apparent throughout, including the following: (i) traditional medicine is the predominant medical system in the region and this system relies on a wide range of wildlife medicinals; (ii) the vast majority of wildlife medicinals used in the region originates from the wild; (iii) exploitation for domestic use constitutes the bulk of medicinal harvest in the region, rather than for export. There is no indication that the level of use of wildlife medicinals for traditional medicine or for export will diminish. On the contrary, there is every reason to believe that the quantities of plants and animals required for traditional medicine will increase substantially in years to come, as human populations grow and acceptance of traditional medicine and natural products in Western markets increases (Lange, 1998). During this survey a growing scarcity of some plant medicines, in particular, has been recorded, alongside the realization that actions must be taken soon to protect threatened species and secure a sustainable supply of valued medicinal products. Depletion of medicinal resources not only embodies a challenge for conservation, but more importantly, represents a serious threat to the health status of human populations in every country surveyed. Acting upon the priorities identified in this study should first and foremost be a step towards reaching medicinal and health security in the region.

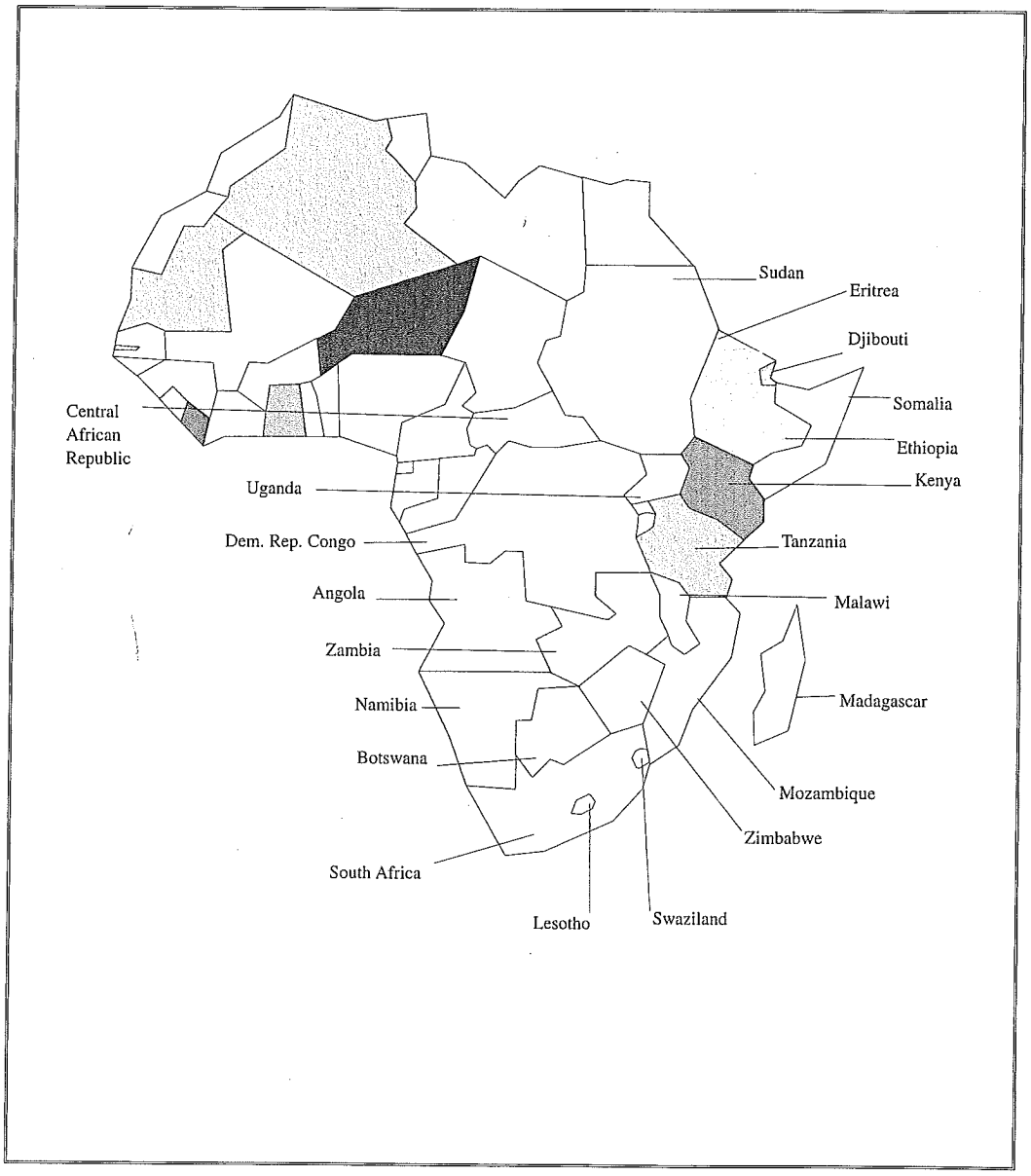
METHODS

This study was carried out over an 18-month period commencing in January 1996, and was co-ordinated by the Kenya Office of TRAFFIC East/Southern Africa. The project was funded by the United States Agency for International Development, with additional funds provided by The Office Plant (for the South African component). The project entailed three phases, including literature review, consultation with experts, and data compilation. The three phases of the study are outlined below:

Phase I - Literature review: A review of relevant English, French, and Italian literature was carried out. In general, most literature relating to medicinal plants focuses on ethnobotany and chemistry, with only a few documents mentioning trade or conservation status and concerns. Some documents present information on commonly used medicinal plants, yet rarely mention source or volumes used. The majority of information

Figure 1

Map to show countries surveyed during research for this report and other countries mentioned.



pertaining to use of animals rarely included reference to medicinal use. The literature review was carried out with the intention of developing a list of species thought to be traded in large volumes, in high demand, or becoming scarce. This list was intended to form a basis for consultation with experts in each country. Insufficient information was found in the literature, however, to form a solid basis for consultation, and hence Phase II (consultation with experts) was expanded to include visits to medicinal markets to collect data on volume traded, on demand and on scarcity of relevant species.

Phase II - In-country consultation: On-the-ground research was carried out in 17 of the 19 countries originally included in this survey (see **Introduction**), Angola and Djibouti having been excluded at an early stage owing to logistical constraints. Research teams ranging from one to eight members visited each of the 17 countries to consult with relevant experts in the fields of wildlife conservation, forestry, health, agriculture, and Customs, and to conduct interviews with collectors, vendors, and exporters of wildlife medicinals, as well as with traditional medical practitioners (TMPs), to collect the following information.

1. **General information on the status of traditional medicine**. Researchers were asked to collect data on what types of TMPs operated in the country, where they administered to patients, how many TMPs were in practice, whether there were traditional medicine associations in existence and, if so, what their objectives were, and the relationship between TMPs and the formal healthcare sector.

2. **Information on the trade structure**. Researchers were requested to ascertain the location of the main medicinals markets, whether the markets were wholesale or retail, and when the markets were open for business. Information on how many vendors operated in each market, their age, gender and nationality was also requested. Researchers also gathered data on collectors, as well as exporters of medicinals, including species that are exported and destinations of exports.

3. **Existence of regulations pertaining to wildlife medicinals and traditional medicine**. Relevant legislation concerning wildlife and forestry, in particular as related to conservation, sale, import/export, and collection of plants and animals, was examined. Also reviewed were any laws regulating the practice of traditional medicine.

4. **Government trade statistics on exports of wildlife medicinals.** Where possible official trade statistics were collected from commerce, wildlife or agriculture departments.

5. **Conservation status of wildlife medicinals in trade**. Researchers were requested to obtain any data on the conservation status of traded species. These data were added to status information collected during the Phase I literature review.

6. **Species-specific information on animals and plants in trade**. Researchers conducted interviews using a standard questionnaire modified for TMPs, vendors, collectors and exporters. Information was collected for species found to be in trade, i.e. sold in markets or administered by TMPs. In order to reduce the scope of the project to a manageable level, medicinal materials collected by households for use within the household, were omitted. Specific information to be gathered through questionnaire-led interviews included:

    - identity of traded species
    - volumes in which species were traded
    - what the species were used for

- what part of the species were used (root, bark, fat, heart, etc.)
- life form (tree, shrub, mammal, etc.)
- conservation status
- impact of harvest
- source (wild-collected, managed or cultivated/captive-bred)
- trade patterns
- price

Information for each species was collected using vernacular names for medicinal material, which was then correlated to published ethnobotanical and ethnobiological accounts to ascertain scientific names. Voucher specimens of each medicine were not collected owing to financial and time constraints. Species were targeted for further attention if:

- they were harvested for roots, bark, the whole plant, or any plant or animal part, the removal of which would be likely to destroy the whole organism, and/or if

- they met at least two of the criteria listed below.

i they were slow-growing
ii they were on sale at local markets and were:
popular and/or expensive
traded in large volumes
iii they were regarded as being scarce or difficult to acquire

Phase III - Data compilation and analysis: Review and analysis of country reports and data on international trade, made up the third phase of this project. Initial lists of priority species developed during Phase II were analysed and refined with the aim of developing a **final list of priority species.** The following factors were considered in the refinement of the species lists, with species usually being removed from the final list if they were:

- propagated or captive-bred in sufficient quantities to meet demand
- introduced or naturalized
- widespread and common
- harvested for a part, e.g. dung or leaves, the removal of which would not destroy the entire organism
- abundant

This process was modified, to take account of the quality and scope of the information collected during this survey, from that proposed by Cunningham (1996).

Some widespread species were found to be under threat only at a local level, but were nonetheless retained as national priorities (see **Tables 30** and **35**). Also of note is the fact that some species were found to be under pressure from factors other than medicinal use, such as over-exploitation for the timber trade.

Constraints

Extent of coverage: Coverage in each country varied, according to temporal and logistical constraints. Some research teams were able to visit numerous locations in a country and gain comprehensive insights into

medicinal markets, while others were only able to visit a few sites. Time allocated for in-country research likewise varied from a few weeks to several months. For example, in Botswana, research was limited to the capital city, Gaborone, while in Malawi medicinal markets were surveyed in Blantyre, Lilongwe, Muzuzu and Zomba. As a result, coverage for some countries is more comprehensive than for others.

Quality of information for plants *versus* animals: It was found that in most countries people are aware of wildlife protection laws and the regulatory status of certain animal species. Where possession or sale was illegal, collection of data was difficult, and often reduced to simple observation of animal species on sale in markets. In contrast, legislation protecting or regulating plant species is generally less stringent, non-existent, or people are unaware of it, and therefore it was generally easier to collect plant-related information.

Quality of government trade statistics: In general, the quality of government trade statistics regarding wildlife medicinals was found to be low and should therefore be interpreted with caution. Where available, however, data have been presented, despite their flaws.

Data collection problems: Researchers were requested to collect information that is viewed by many as secret or valuable. The short period of time available for data collection in many cases no doubt served to limit the quality of the information collected, as time is an important factor for gaining the trust of informants. Furthermore, information on sources of supply was also viewed as confidential by some who were worried about competition for increasingly scarce resources. Price information was similarly difficult to acquire and often inaccurate as vendors frequently hoped to sell material, or sought to profit from the research.

Species identification: Identification of medicinal material was achieved through the observation of researchers, or through comparison with published dictionaries or similar works of vernacular and scientific names, such as the *Dictionary of Plant Names in Malawi* (Binns, 1972), or *Traditional Medicine in Botswana: Traditional Medicinal Plants* (Hedberg and Staugard, 1989). While it would have been useful to collect voucher specimens to ensure accurate identification, this option was not possible because of lack of time, and financial constraints. It is therefore acknowledged that not all wildlife medicinals seen or reported in use were necessarily that which they appeared to be or were claimed to be.

Lack of information on species: For many plant species, information on abundance and conservation status was simply unavailable and in these cases it was difficult to conclude anything about the impact of harvest or trade.

Definitions

Traditional medicine in the context of this report is used to refer to treatment of physiological, psychological, and other problems with plant, animal or mineral material, according to a traditional system of the region. Application of this material for ceremonial or religious purposes associated with healing is also included in this definition.

The term **traditional medical practitioner** (TMP) is used in a broad sense in this report in that it includes herbalists, midwives, and other specialists in medical and religious problems, for example, bone-setters and diviners, who use traditional medicine.

Wildlife medicinals are animal or plant materials used to prevent or cure illnesses or injuries. They may

also be used for their narcotic, stimulant, hallucinogenic, or toxic effects, be ingested for ritual or religious purposes, or used as talismans, for healing or protection.

The term **Western medicine** is used to describe medical practices and services based on biomedical principles.

It appears that in the past most TMPs gathered the wildlife medicinals (in particular plants) that they used themselves but that in an increasingly commercialized and urbanized world this is not always possible. As a result, a niche has arisen for **collectors** who often travel long distances to procure plant and animal medicinals for eventual sale to vendors, or TMPs, or for their own use, if they are themselves practitioners. Collectors may also gather material for export.

Vendors in the context of this report are those who buy and sell wildlife medicinals, frequently in markets, shops, or on an itinerant basis. Although some may be knowledgeable enough to advise customers on use of the medicines they sell, for most serious problems, TMPs are consulted.

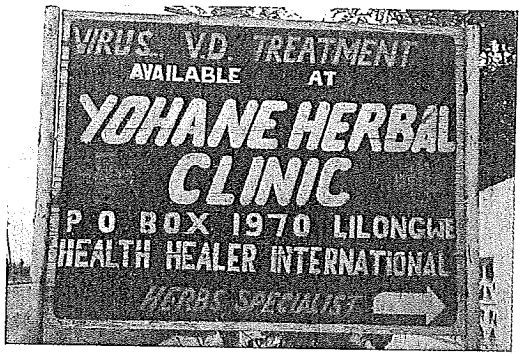
RESULTS

Use of traditional medicine in the region

Utilization of wildlife medicinals is overwhelmingly domestic and therefore this report focuses on traditional medicine, the dominant medical system in the region. Nevertheless, harvest of plants and animals for international markets has been noted where it was found to occur.

Traditional medicine has been suppressed or regulated in almost every country in the region at some time this century. Colonial administrations had little faith in the efficacy of traditional medicine, and saw it as a system that prevented patients from receiving effective Western medicine (Chavunduka, 1994). Furthermore, connections between traditional medicine and witchcraft and beliefs that disease could be caused by supernatural forces, rendered traditional medicine a perceived threat to the spread of Christianity (Chavunduka, 1994). Diviners, in particular, were regarded as purveyors of witchcraft, and were blamed for using non-natural means to cause disease. This assumption was manifested in legislation, for example in Botswana's *Bechuanaland Protectorate Witchcraft Proclamation of 1927*, which forbade the practice of using non-natural means to cause disease or injury, the employment of witchdoctors, and the provision of advice about how to bewitch people using charms or witchcraft. The proclamation also specified that no person, for the purpose of gain, should pretend to exercise or use supernatural power, witchcraft, sorcery, enchantment or conjuration, to locate stolen or lost goods (Staugard, 1985). Zimbabwe's *Witchcraft Suppression Act, Cap. 73 of 1889*, was more specific and defined witchcraft as "the throwing of bones, the use of charms and any other means or devices in the practice of sorcery" (Chavunduka, 1994). While this act is still in effect in Zimbabwe, traditional medicine has been legalized through the *Traditional Medical Practitioners Act, No. 38 of 1981* (Chavunduka, 1994), and today traditional medicine is viewed with a more open mind by authorities.

Traditional medicine in east and southern Africa is viewed as the most appropriate means of addressing certain problems, not necessarily of the same nature as those usually treated by Western medicine. Ulin (1974) reported that, in a survey of nine traditional healers in Botswana, approximately 50% of the cases treated were for complaints not normally regarded as illnesses, such as crop failure, unsuccessful personal relationships, or inability to find work. Differing concepts of disease lead people to seek different



Credit: T. Milliken

Sign for a traditional medicine clinic, Lilongwe, Malawi

treatments, and to consult the practitioner whom they think is most able to solve their problem. For example, upper respiratory problems are regarded as "European diseases" in Botswana, best dealt with by Western medicine, whereas infertility is thought to be a Tswana disease (Ulin, 1974). Tswana illnesses are themselves divided into categories, such as those caused by a breakdown in morality (such as the breaking of sexual taboos, for example, the failure to observe the period of seclusion following widowhood); those caused by witchcraft, whereby someone wants to harm another person; and those caused by neglecting ancestral spirits (Ulin, 1974). All these illnesses are considered best treated with traditional medicine.

Not only is traditional medicine viewed as the best method for some treatments, but it is clear from **Table 1** that the number of TMPs practising in the region is far greater than the number of Western medics, a situation both reflecting and perpetuating the importance of traditional medicine. As will be seen in the country reports following, availability of traditional medicine invariably outweighs that of Western medicine.

Many treatments prescribed by TMPs have proven medical effects, and as such are more readily accepted by health agencies and Western medical practitioners as effective. Indeed, TMPs are collaborating with governments in implementing national health programmes in some countries, such as Zambia (Muswema and Mpengula, 1997) and Zimbabwe (Chana *et al.*, 1994). Traditional medicine associations have been documented in nearly all countries in the region studied (see **Country reports**), and many have formal links with their health ministries and are recognized as having positive inputs into their respective national health systems. Some have been formed with the aim of promoting traditional medicine and addressing relevant legal issues. For example, the Green Medicine Association in Sudan is assisting with the revision of the *Pharmacy and Poisons Act of 1963*, which prohibits all traditional medical practices. The new *Pharmacy and Poisons Act of 1997* will legalize traditional medicine, and among other things, involve TMPs in Sudan's primary health programmes (MAPRI, 1997).

Traditional medicine associations identified during this survey are listed in **Table 2**. These listed associations, while not representative of the total number of traditional medical practitioners in the region, represent steps that TMPs have taken to promote and legitimize the profession of traditional medicine.

Notwithstanding the reasons outlined for the use of traditional medicine, many people simply prefer this medical system over other options. From a cultural perspective, people are comfortable with traditional medicine and are satisfied with its results. Hence many choose traditional medicine regardless of the existence of Western medicine.

Table 1

Ratios for doctors (practising Western medicine) and TMPs to patients in east and southern Africa

Country	Doctor:patient	TMP:patient	References
Botswana	-	TMPs estimated at 2000 in 1990	Moitsidi, 1993
Eritrea	medical doctors estimated at 120 in 1995		Government of Eritrea, 1995
Ethiopia	1:33 000		World Bank, 1993
Kenya	1:7142 (overall)	1:987 (Urban-Mathare)	World Bank, 1993
	1:833 (Urban-Mathare)	1:378 (Rural-Kilungu)	Good, 1987; Good, 1987
Lesotho		Licensed TMPs estimated at 8579 in 1991	Scott *et al.*, 1996
Madagascar	1:8333	-	World Bank, 1993
Malawi	1:50 000	1:138	Msonthi and Seyani, 1986
Mozambique	1:50 000	1:200	Green *et al.*, 1994
Namibia	-	1:1000 (Katutura) 1:500 (Cuvelai) 1:300 (Caprivi)	Lumpkin, 1994
Somalia	1:14 285 (overall)	-	World Bank, 1993
	1:2149 (Mogadishu)		Elmi *et al.*, 1983
	1:54 213 (central region)		Elmi *et al.*, 1983
	1:216 539 (Sanag)		Elmi *et al.*, 1983
South Africa	1:1639 (overall)	1:700-1200 (Venda)	World Bank, 1993
	1:17 400 (homeland areas)		Savage, 1985*; Arnold and Gulumian, 1987*
Sudan	1:11 000	-	World Bank, 1993
Swaziland	1:10 000	1:100	Green, 1985; Hoff and Maseko, 1986
Tanzania	1:33 000	1:350-450) (Dar es Salaam)	World Bank, 1993; Swantz, 1984
Uganda	1:25 000	1:708	World Bank, 1993; Amai, 1997
Zambia	1:11 000	-	World Bank, 1993
Zimbabwe	1:6250	1:234 (urban) 1:956 (rural)	World Bank, 1993 Gelfand *et al,* 1985

Note: references with an asterisk "*" are in Cunningham, 1993b.

Table 2

Traditional medicine associations in the region identified during this survey

Country	Association	Members	Objectives/activities
Botswana	*Dingaka* Society Botswana *Dingaka* Association *Kwame* Traditional Association United Herbalists Association	220 31 1629 6	
Ethiopia	Ethiopian Traditional Medical Practitioners Association	830	To promote traditional medicine and maintain clinics.
Kenya	Kenya Herbalists Society	300	To promote traditional medicine, improve hygiene, serve as a forum for information exchange; to organize seminars.
Lesotho	Lesotho Universal Medicinemen and Herbalists Council	c. 1900	To influence government policy discussions.
Madagascar	*Association des Assistants Médecins Malagasy*	?	To promote and defend traditional medicine.
Malawi	Herbalists' Association of Malawi African Herbalists Traditional Medicine *Asing'anga* of Malawi Chizgani Ethnomedical Association of Mzuzu	c. 2000 ? 250	To serve members and improve community-based health care services; to co-operate with research institutions and provide information and training to members. Use up-to-date methods to treat patients; to co-operate with MoH by referring seriously ill patients to hospitals. To serve as a forum for discussing difficult cases; to collaborate and co-operate with other institutions; to exchange information about new techniques; to perpetuate positive traditional healing.
Mozambique	*Associacao dos Medicos Tradicionais de Mocambique*	25 000	
Namibia	National Eagle Traditional Healers Association	2400	To promote traditional medicine; to collaborate with appropriate government agencies; to have a voice in policy.
South Africa	Traditional Healers Organization	80 000	
Sudan	Green Medicine Association	50	To influence government policy and legislation; to serve as a forum for exchange of ideas.
Swaziland	Swaziland Traditional Healers Society	?	
Tanzania	Tanzania Association of Traditional Healers and Midwives	3000	To promote traditional medicine; to serve as a forum for bringing TMPs together; to improve co-operation between TMPs and health agencies and the government.
Uganda	*Uganda ne ddagala lyayo* Uganda Herbalists Association	1850 1642	To promote traditional medicine and cooperation.
Zambia	Traditional Healers and Practitioners Association of Zambia (THPAZ)	35 000	To promote traditional medicine and collaborate with government health agencies
Zimbabwe	Zimbabwe National Traditional Healers' Association Zimbabwe Traditional Healers Association	52 500 ?	To promote traditional medicine.

Sources: Amai, 1997; Cunningham, 1995; Desalegn *et al.*, 1996; Kahatano, 1997; Maliwichi, 1997; Mander *et al.*, 1996; MAPRI, 1997; Mukamuri, 1996; Muswema and Mpengula, 1997; Quansah and Ranaivoarimanitra, 1996; Scott *et al.*, 1996; Simiyu *et al.*, 1996; Staugard, 1985;

Country reports for north-eastern Africa

Sudan

Background: *Area:* 2 505 815km^2. *Population:* Estimated to be approximately 27 million in 1993, excluding the many refugees present in the country from neighbouring states such as Central African Republic, Chad, Eritrea, Ethiopia and Nigeria. The national income has decreased substantially because of civil war, which began in 1955. *Flora*: An estimated 3200 plant species, including 50 endemics (IUCN, 1990).

Sudan is composed of varying habitats ranging from desert and semi-desert in the north; *Acacia*-wooded grassland in the Sahel zone of the central part of the country; swamps and floodplains in the south-east; lowland forest patches along the Democratic Republic of Congo (DRC) border; and Sudanian woodlands and montane forest in the south (Harrison and Jackson, 1958; IUCN, 1990).

Research carried out for this survey (MAPRI, 1997) was restricted to the capital, Khartoum.

Medical context: Throughout its history, Sudan has experienced considerable external influences on traditional medical practices from neighbouring countries and ethnic groups. Invasions and migrations brought medical influences from west Africa, Arabia, and even the Far East. As such, Sudan not only has a unique medical system representing a blend of cultures, but it has also incorporated numerous plants introduced into the country by its many immigrants (Ayoub and Svendsen, 1981).

Economic hardship has had repercussions in the health sector, and the government no longer provides free services in health clinics and hospitals. Consequently, Sudanese traditional medicinal products are an important resource for the health care of much of population, who do not have access to, or cannot afford, Western medicine (El Ghazali, 1986; El Ghazali *et al.*, 1987; El Ghazali *et al.*, 1994). In 1980, it was estimated that over 80% of the population used traditional herbal medicine (El-Kheir and Salih, 1980). Traditional medicine is particularly important in rural areas, which have experienced a reduction in numbers of Western medical professionals, who migrated to urban centres as the economic situation deteriorated (MAPRI, 1997).

While the precise number of TMPs practising in Sudan is unknown, MAPRI (1997) recorded 54 in Khordofan State, 75 in Blue Nile State, and seven in Northern State. In Khartoum, there were found to be about 35 well-reputed traditional healers, most of whom were men. It is likely that there is a large number of traditional healers, many of whom are religious men and guardians of holy tombs and mosques, among the elderly population (MAPRI, 1997). In Sudan, traditional healers were found to include: herbalists; bone setters; and spiritualists, who primarily treat ailments of the central nervous system such as epilepsy, Parkinsonism, psychosis, depression and mania (MAPRI, 1997).

The association of traditional healers, *Green Medicine Association*, established in Sudan has a membership of 50, mostly from Khartoum but including healers from other parts of the country. The association is active in promoting traditional medicine and is working with the government to revise existing legislation pertaining to traditional medicine (MAPRI, 1997).

Trade: Sudanese traditional medicine uses both plant and animal material, and a range of wildlife medicinals were available in Khartoum. Medicinals traded in Khartoum originated from various regions in

Sudan, as well as from outside the country. Plants had reportedly been collected primarily in the west and central regions, although a number of valued species occur widely and had consequently been collected from a larger area. It was noted that collectors generally fell into one of two categories: those collecting two to three types of medicinal in large volumes for exporters, and those collecting a wider range (around 30-45 types) in small volumes for local use. Collectors of exported medicinals usually also acted as processors, cleaning, sorting, and grinding material prior to export. Collectors of local medicines were often also healers' assistants or vendors (MAPRI, 1997).

Vendors of medicinals seen in Khartoum were local inhabitants, who had well-established retail or wholesale shops open six days a week. It was estimated that there were about ten to 15 vendors operating well-established shops, although there were also vendors located outside mosques and near market centres. Vendors usually sold items to fill prescriptions from traditional healers but occasionally acted as healers, if they had the necessary knowledge about certain wildlife medicinals (MAPRI, 1997).

Medicinal plant species in trade in Khartoum are reportedly wild-collected, although several, such as *Citrullus colocynthis,* are also apparently cultivated. Species believed of wild origin traded in large volumes in Khartoum included: *Acacia nilotica*, *Acacia seyal*, Baobab *Adansonia digitata*, *Balanites aegyptiaca*, *Boswellia papyrifera*, *Cassia alexandrina*, *Citrullus colocynthis*, *Salvadora persica*, and *Terminalia brownii*. In addition, large quantitites of four naturalized species, *Ambrosia maratima,* Neem *Azadirachta indica*, Sweet Basil *Ocimum basilicum* and Castor-oil plant *Ricinus communis*, were traded in Khartoum.

The highest priced wild-collected plant species seen was *Aloe sinkatana*. At approximately the local currency equivalent of USD15/kg for leaf exudate, the cost was the highest encountered for any plant medicinal during this survey. *Aloe sinkatana* was said to be collected from north-eastern Sudan and the species occurs in the Red Sea Hills between Sinkat and Erkowit. In the early 1960s, it was reported as being abundant near Sinkat, and rarer at the higher elevations near Erkowit (Reynolds, 1966). No current information is available on the status of this species. Both the leaves and the leaf exudate are used to treat a variety of ailments, including skin diseases, constipation, haemorrhoids, worms, fever, diabetes, tonsilitis and inflamed colon (MAPRI, 1997).

A total of 17 animal species used medicinally were recorded in trade in Khartoum, including the domestic camel and donkey. No information was collected on frequency of use or trade volumes. These species are listed in **Annex 1**.

International trade: Sudan is the source of a number of medicinal plants valued in international markets (Ayoub and Kingston, 1981). Recent figures indicate that Sudan is an important supplier to Germany of plants and plant parts traded under Harmonised Commodity Description and Coding System tariff heading 12.11, i.e., plants used primarily in perfumery, pharmacy, or for insecticidal, fungicidal, or similar purposes. A total of 3755.4t of these were exported to Germany in 1994 (Lange and Schippmann, 1997). Many species valued in traditional medicine are also exported for non-medicinal purposes. For example, Henna *Lawsonia alba* is used locally for treatment of urinary infections and skin diseases, but is exported as a dye.

Most Sudanese plant exports are of cultivated origin, with the exception of *Boswellia papyrifera* and senna *Cassia* spp. *Boswellia papyrifera* is traded for its gum, known as Olibanum. Olibanum is used as a traditional medicine in Sudan and is exported to Europe, North America and Asia, with exports averaging 760t per year for the period 1992-1996 (MAPRI, 1997). In Europe, it is used to relieve nasal congestion, and is widely available in the form of waxed sticks (F. Dennis *in litt.* to N. Marshall, 1997). It is also used

for aromatic purposes, and is used in the preparation of traditional medicines in China (Coppen, 1995a). There are 13 species of *Cassia* in Sudan, *C. acutifolia* and *C. angustifolia* being the principal species harvested for export. Valued as a laxative, leaves and pods of *Cassia* spp. are exported to Europe, North America and Asia; the average annual export between 1992 and 1996 was 7740t (ITC, 1994; MAPRI, 1997). While harvest of *Cassia* spp. is not regarded as a threat to wild populations, there has been some concern voiced about over-harvest of *Boswellia papyrifera*, as unskilled gum collectors have caused frequent and excessive wounds to trees, thereby contributing to their death or ill-health.

Both *Acacia senegal* and *A. seyal* produce gum, which is exported from Sudan for use primarily in the food and printing industries, but also in the pharmaceutical industry in tablet manufacture. For the period 1988 to 1994, exports averaged 20 339t per year. *Acacia senegal* gum is tapped from both natural stands and plantations (Coppen, 1995b); excessive gum extraction can cause trees to die (MAPRI, 1997).

Legislation: The most important legislation relating to the conservation and management of wildlife in Sudan is the *Preservation of Wild Animals Act, 1935*, amended in 1986. This Act contains three schedules of species with varying degrees of protection, and outlines permit procedures for the taking of wildlife. The *Forests Act of 1989* specifies regulations pertaining to activities in forest reserves, and specifically prohibits the cutting, collecting, taking, destroying, injuring or converting to private benefit forest produce in certain reserved areas. A removal pass is required for the harvest of forest produce, and a permit required to transport it (IUCN, 1986; MAPRI, 1997).

Sudan has been a Party to CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora) since 1983.

The only regulation pertaining to traditional medicine is the *Pharmacy and Poisons Act of 1963*, which prohibits all traditional medical practices. This Act is not enforced, and is under review. A new *Pharmacy and Poisons Act of 1997* which would legalize traditional medicine has been drafted, and is awaiting approval by Parliament. Furthermore, the Ministry of Health, in its continuing efforts to legalize, regulate and incorporate traditional medicine into primary health care programmes, has issued the regulation, *Manufacturing and Circulation of Plant Preparations 1996*, which aims to register Sudanese medicinal plant preparations and prohibit the import of medicinal plants and preparations originating outside the country. The principal objective of this regulation is to ensure the safety and quality of Sudanese herbal remedies and to promote the use of Sudanese medicinals (MAPRI, 1997).

Conservation: In this survey, 12 plant and three animal species which are used medicinally in Sudan were identified as being species worthy of conservation action (see **Table 3**). While most are considered under threat because of medicinal use, some are listed because other factors have led to their precarious status.

Omitted from **Table 3** are a number of plant species, the parts of which were reported as traded in large volumes, but which are harvested in such a way as to be non-destructive to the whole plant. These species are: *Acacia nilotica* (fruit), *Boswellia papyrifera* (gum), and *Citrullus colocynthis* (fruit). Also omitted from the list are two species reported to be expensive, which are *Croton zambesicus* and *Grewia tenax*, both traded for their fruit. *Guiera senegalensis*, the leaves of which are used to treat hypertension, and *Nauclea latifolia*, the fruits of which are valued as a remedy for dysentery, are both reported to be scarce as medicinals in Khartoum, but as the parts harvested do not cause destruction of the whole plant, these species have also been omitted from **Table 3**.

Table 3

Medicinal plant and animal species reportedly of conservation concern in Sudan

Scientific name	Life form	Part used	Medicinal uses	Reason for concern	Distribution and notes
Acacia seyal	tree	wood	used as a fumagent for	traded in large volumes	widespread in Africa; harvested for timber
Adansonia digitata	tree	fruit, bark	dysentery	traded in large volumes	widespread in Africa; bark harvested for cordage
Aloe sinkatana	succulent	sap/exudate extracted from the leaf	skin diseases, constipation, fever, tonsillitis, haemorrhoids, inflammed colon	very high price; scarce in Khartoum; depleted in the wild	endemic, valued as an ornamental
Balanites aegyptiaca	tree	fruit, bark	dysentery, tumours, wounds, constipation	traded in large volumes	widespread; high demand for timber for furniture
Boscia senegalensis	shrub/ tree	leaf, root	bilharzia, TB, muscle pain	scarce in Khartoum	
Haplophyllum tuberculatum	whole plant			scarce in Khartoum	
Hydnora abyssinica	parasite	whole plant		scarce in Khartoum; relatively high price	occurs in central Sudan; it is a parasite infecting *Acacia* roots
Khaya senegalensis	tree	bark, wood	malaria, skin diseases; trachoma, gastroenteritis	scarce in Khartoum	widespread; valued as a timber
Salvadora persica	shrub	twig, root, leaf	toothbrush, hypertension, stomachache, eye infection, wounds	traded in large volumes; becoming depleted	tropical Africa to Asia
Solenostemma argel	perennial herb	whole plant	carminative, diabetes, anti-spasmodic	scarce in Khartoum	north-east Africa and Arabia; monotypic genus
Terminalia brownii	tree	wood	rheumatism, back pain	traded in large volumes	widespread distribution; also valued as a timber
Ceratotherium simum cottoni Northern White Rhinoceros	mammal	horn	poison antidote	extinct? in Sudan; Critically Endangered	occurs in Sudan and DRC; demand for international trade

Table 3 continued

Scientific name	Life form	Part used	Medicinal uses	Reason for concern	Distribution and notes
Crocodylus niloticus Nile Crocodile	reptile	genitalia	aphrodisiac	reported to be declining	widespread in Africa; illegal trade in skins has led to population declines
Struthio camelus Ostrich	bird	fat	arthritis	population declines in Northern Darfur and Khordofan; possibly extinct in Red Sea Province	widespread in east and southern Africa, declining in central Africa

Source: adapted from MAPRI, 1997.

Note: Although six plant species are recorded (above) as being "scarce in Khartoum", the reasons for this are unclear: it could be that the species are only available seasonally and therefore were absent from Khartoum markets.

Of the animal species listed in **Table 3**, the Northern White Rhinoceros *Ceratotherium simum cottoni* is under threat for trade in its horn, which is traded either to the Middle East to be made into dagger handles, or for use in traditional East Asian medicine. If used locally, the powdered horn is valued as a poison antidote, as is the whole horn when made into a cup; use of such a cup is believed to remove any poison from the liquid therein. There have been no formal surveys of rhinoceroses in Sudan for almost two decades but this species is believed to be on the verge of extinction, if not already extinct, in the country and any trade, either local or international, is highly illegal and a definite conservation concern (MAPRI, 1997; T. Milliken, pers. comm. to N. Marshall, 1997).

The conservation status of the Ostrich *Struthio camelus* is relatively precarious in Sudan, and the country's population of the species is listed in CITES Appendix I. The Ostrich is most probably extinct in Red Sea Province and is threatened in Northern Darfur and Khordofan (MAPRI, 1997). The Nile Crocodile *Crocodylus niloticus*, not threatened or under pressure for its medicinal (aphrodisiac) properties, has experienced population declines in the past owing to an illegal trade in hides, causing some concern at the national level. At present, there is at least one crocodile farm and the species has reportedly recovered in the vast swamplands but, because of local insurgency, no surveys have occurred to verify this assumption (T. Milliken, pers. comm. to N. Marshall, 1997).

Conclusion: The Government of Sudan appears to be encouraging use of traditional medicinal resources, not only because of the high cost of Western medicine, but also because it believes that TMPs can contribute to the health of Sudan's inhabitants. By involving TMPs in the legislative process, the government will be better placed to work with them to address any conservation concerns relating to exploitation of wildlife medicinals. Sudan cultivates numerous plant species exported for their medicinal, cosmetic, aromatic, and other qualities, and has the technical knowledge to establish plantations and market commercial crops. Such knowledge could be beneficial for promoting cultivation of locally valued medicinal plant species.

Recommendations

- Promote cultivation of popular medicinal plants of conservation concern in order to reduce pressure on wild populations.
- Work with traditional healers to reduce the effect of collection of plant parts that are instrumental in the survival of the plant.
- Provide technical advice to unskilled gum collectors to promote sustainable gum collection.
- Encourage enforcement of wildlife legislation in order to reduce illegal trade in fauna for medicinal purposes.
- Address the situation of the declining Ostrich populations, by strengthening protection and investigating ranching options.

Somalia

Background *Area:* 638 000km^2. ***Population:*** Estimated at 5 400 000 in 1996 (IUCN, in prep.).

About 63% of the land is either non-productive or suitable only for grazing, 27% is marginally cultivable, and 9.4% is suitable for cultivation, although only one per cent is actually under cultivation at present (Barkhadle, 1993). The vegetation varies from montane bushland and *Juniperus* forest in the northern mountains to semi-desert grassland and deciduous shrubland with patches of coastal semi-evergreen bushland and riverine forest in the south (IUCN, 1990). About 23% of the population live in the larger urban centres (Barkhadle, 1993). Over 60% of the population is engaged in animal husbandry (50% are nomadic) and in 1990 about 80% of the national export revenues were derived from livestock (Barkhadle, 1993). Ninety-two percent of domestic energy demand is provided by fuelwood and charcoal (IUCN, 1993).

Since late 1990, Somalia has been in a state of civil war. This has led to the disruption of government services and activities. In 1997, a schism between south and north Somalia led to the formation of two separate political entities, the Somali Republic, effectively coincident with the Italian colonial territory, and the self-declared Republic of Somaliland in the north, effectively coincident with ex-British Somaliland. Because of continued fighting, movement within the country of most inhabitants has been severely reduced. Scientific research has been minimal, and aid agencies have focused on refugee and food relief activities. This situation is slowly changing, especially in the self-declared Republic of Somaliland, where agencies are beginning to address natural resources issues.

Because of continuing civil war conditions, research carried out for this project (Farah, 1997) was limited to the northern port city of Bosaso in the Bari Region. Within that area, 20 TMPs were interviewed.

Medical context: Literature reviewed during this survey largely pertains to the pre-1991 situation in Somalia. Western medicine was available in Somalia prior to the advent of the civil war, although use of traditional medicine was far more prevalent. Yusef *et al.* (1983) conducted surveys demonstrating that 96% of the rural population and 72% of urban dwellers had positive attitudes towards the practice of traditional medicine. In terms of Western medicine, there were 23 regional hospitals, 52 district hospitals, and one bed for every 1136 inhabitants in Somalia, prior to the civil war (Elmi *et al.,* 1983). There were also 430 doctors practising Western medicine in the country, about 70% of whom were based in Mogadishu (Elmi *et al.,* 1983). It can be assumed that a number of hospitals have been destroyed by hostilities in Somalia, but more recently rehabilitation of some hospitals has commenced (A. Forbes, pers. comm. to N. Marshall, 1997). The number of doctors practising Western medicine in rural areas has been recorded as extremely few (see **Table 1**) and bearing this in mind, it is not surprising that the population of Somalia has relied heavily on

TMPs (Yusuf, *et al.*, 1983). TMPs, by contrast, are estimated to number in the thousands and can be found in most villages. In addition, many people have knowledge of herbal remedies and are able to administer these themselves (Elmi *et al.*, 1983).

Elmi (1991) observes that there are two methods of traditional curing in Somalia. The first is ceremonial healing, a system based on the celebration of religious or magical rites and the second is that of practical treatment, which includes herbalism.

In 1983, Elmi *et al.* reported that, overall, approximately 200 plant species were used in Somali traditional medicine, although most TMPs used only about 30-40 species on a regular basis. In the urban areas, herbalists may act as healers, or may only operate dispensaries. TMPs often employ an apprentice to collect plants from the rural areas, or even occasionally purchase herbs from a supplier. The situation differs for rural-based TMPs, who collect the herbs they use themselves (Elmi *et al.*, 1983).

According to Ahmed (1995), efforts were made by the Ministry of Health to incorporate traditional medicine into the government health care system. These efforts began as early as 1974, when the Ministry of Health initiated an evaluation system by which traditional medical practitioners were tested and if successful were awarded testimonial certificates. Accomplished TMPs were encouraged to integrate into the public health care system (Elmi, 1980).

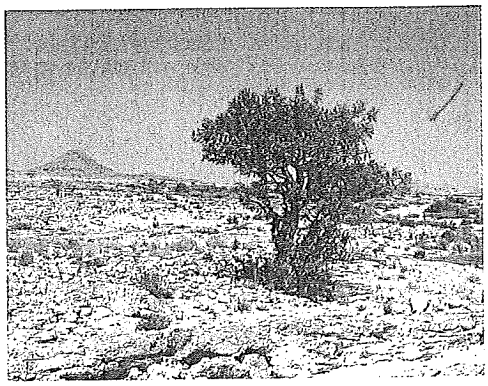
Nearly all the 20 TMPs interviewed for this report collected their own plant and animal materials and treated members of the local population. Many TMPs had no area of specialization, while others specialized in various ailments such as snakebite, infections and wounds, nervous disorders, or sexually transmitted diseases (STDs). Female TMPs specialized in gynecological or children's problems (Farah, 1997).

Trade: Research undertaken during this survey did not find any collectors or exporters of wildlife medicinals present in the Bosaso region. Medicinals were found to be collected primarily by TMPs and only one vendor was identified, and he also functioned as a TMP (Farah, 1997). The TMPs questioned reported that trade patterns have remained constant in recent years. A total of 52 medicines made from plants were recorded and 23 were identified at the species level through comparison with published accounts of Somali medicinal plants, e.g. Elmi *et al.* (1986), Mahoney (no date), and Samuelsson *et al.* (1991, 1992a, 1992b, 1993).

Medicinal plants were said to be generally easily obtainable, but dry season conditions and the existence of mountainous areas sometimes made collection difficult (Farah, 1997). All plant species used were reportedly collected from the wild.

Animal species noted in use in Somali traditional medicine included the Ostrich, bustards Otididae, the North African Crested Porcupine *Hystrix cristata*, hyaena (species unknown) and sea turtle (species unknown). The bustards and Ostrich were identified as being very difficult to acquire, their scarcity attributable to the increased use of guns, as well as loss of habitat. The flesh and fat of bustards were reported as very effective against heart and liver complaints, and a soup is made from bustard for treating asthma (Farah, 1997). It is likely that other animal species are used in Somali traditional medicine. Oil from sea turtle has been reported on sale in Mogadishu as an aphrodisiac (A. Forbes, pers. comm. to S. Milledge, 1997).

International trade: Minimal international trade in medicinal plants has been recorded in this area recently, although prior to the civil war Somalia was a significant exporter of gums and resins, some of which may



Credit: WWF/Hartmut Jungius

Frankincense tree *Boswellia sacra*

have been destined for pharmaceutical application. Somalis living in north-east Ethiopia are known to transport Frankincense *Boswellia* spp., Gum Arabic *Acacia* spp., Opopanax and Myrrh *Commiphora* spp. to the Somali Republic, although this informal trade has broken down somewhat since 1990 (Ayele, 1996). Somalia does export Frankincense *Boswellia sacra* to China for medicinal purposes. Official export records are largely unavailable; however, it is estimated that exports are approximately 150t per year (Janssen and Harries, 1997). *Catha edulis* (known as Khat, Qat, or *Miraa* in the region) is imported into Somalia from Kenya and Ethiopia. This shrub is native to east and southern Africa, and is cultivated extensively in Yemen, Ethiopia, and parts of Kenya. It is widely known for the mild psycho-stimulation induced by chewing its fresh leaves, a habit practised by an estimated five to ten million people worldwide (Beekhuis, 1997). *Aloe* extract is said to be exported to Ethiopia (Desalegn *et al.*, 1996).

Legislation: At present the legislative situation is unclear because of the current political situation in the country. Prior to the start of the civil war, the *Law of Fauna (Hunting)* and *Forest Conservation (No. 15 of 1969)* laid out regulations for hunting, as well as for the establishment of Forest Reserves, the protection of vegetation within Game Reserves, and the protection of designated tree species on unreserved land (Douthwaite, 1987).

Somalia has been a Party to CITES since 1986.

Conservation: Traditionally, Somali TMPs are said to have had great respect for their healing plants and to have taken care not to destroy the plant when gathering specimens (Elmi, 1991). Exploitation of plants for medicinal purposes was not judged by TMPs consulted to be unsustainable, but the conservation status of Somalia's forest reserves is precarious, because of unchecked degradation and destruction as a result of unsustainable harvest of forest products, clearance for cultivation, fuel, timber and grazing (Magwick, 1989). Charcoal production for export to the Middle East is also affecting the status of *Acacia* spp. (especially *A. bussei*) in the coastal lowlands (A. Forbes, pers. comm. to N. Marshall, 1998; Jibrell, 1996), a situation which may have a negative impact on the production of Gum Arabic.

The scarcity of bustards reported by TMPs is worthy of further investigation. There are eight species of bustard occurring in Somalia, in three genera: *Eupodotis*, *Otis*, *Neotis* (Ash and Miskell, 1983). IUCN (1990) reported that Somalia is the most important country in the northern hemisphere for bustards, and that Hartlaub's Bustard *Eupodotis hartlaubii*, Little Brown Bustard *Eupodotis humilis*, and Heuglin's Bustard *Neotis heuglini* have restricted populations. All TMPs interviewed who used bustard expressed concern about diminishing supplies, as they did also in the case of Ostriches.

Conclusions: Traditional medicine is of critical importance to the Somali people. Past government efforts to integrate TMPs into the formal health sector and specifically to promote collaboration between Western doctors and TMPs are testament to the recognition of the role that TMPs play in national health issues. Supplies of required medicinal plant species appear to be stable, although little information exists on the conservation status of Somali plant resources, hence it may be prudent to encourage research in this area to

avert any possible declines. The decrease in bustard and Ostrich populations is a cause for concern, not only from the conservation viewpoint but also because these species are in demand by TMPs, and there is no indication that demand will subside. Current hunting methods (guns) have the potential to deplete numbers of these species severely and it would be useful to develop management and education initiatives to ensure future supply and stability of bustard and Ostrich populations, as well as of other species of medicinal value. The Ostrich, in particular, provides an interesting case in which a species of medicinal value is already being ranched extensively in countries such as Zimbabwe; it would be useful to learn whether by-products of the ranching operations in Zimbabwe could be used to satisfy demand for Ostrich products in Somalia and other countries reporting insufficient supply.

Recommendations

- Investigate the status of all eight species of bustard, and the Ostrich.
- Ascertain cause of bustard declines and develop strategies for stabilizing the population, which could include captive breeding for medicinal use.
- Explore the possibility of procuring Ostrich products from existing ranches in other countries, or setting up Ostrich ranches in Somalia.
- Ensure that controls are in place to protect Ostriches from other threats, such as unsustainable egg collection.

Eritrea

Background: *Area*: 123 300km^2. *Population:* An estimated 2.7 million; a further 0.8 million Eritreans are refugees in other countries.

The country is divided into four eco-geographic zones, all of which receive under 600mm of rainfall each year. The topography varies from rugged highland mountains to coastal plains subject to severe wind erosion and precipitation of under 200mm per year. Forest cover in Eritrea has been reduced enormously over the past century, from 30% to approximately one per cent today (Government of Eritrea, 1995). Natural resources in Eritrea, in particular in forests, have come under pressure for a number of reasons, including conversion of forest land to agriculture, consumption of fuel wood (about 4.4 million m^3/yr), construction of traditional houses, and the 30-year war, during which forests were cleared to build forts and other structures (Government of Eritrea, 1995). The most significant factor contributing to the depletion of animals and plants is Eritrea is undoubtedly loss of habitat, yet over-exploitation and the introduction of exotic species have also had adverse effects.

The major form of livelihood is agro-pastoralism which is practised by 70% of the population (ERRA, 1994).

Owing to unforeseen circumstances, field research in Eritrea was minimal and the majority of the information contained in this section has been drawn from available literature.

Medical context: After 30 years of war, the Eritrean health care system suffers from an acute lack of infrastructure and adequate facilities. At the same time, the Ministry of Health has, since liberation, made a great effort to initiate a nationwide health programme, and access to health facilities has increased (Mineab and Eyob, 1995). The Government of Eritrea is actively embarking upon a programme to address environmental health hazards through primary health care and, in particular, is targeting sanitation and hygiene (Tekeste, 1995).

Because of the low level of health care availability and awareness at present in the country, Eritrea has high rates of occurrence of vector-borne diseases, such as malaria, schistosomiasis, leishmaniasis, onchocerciasis, and a variety of diarrhoeal diseases. Problems caused by nutritional deficiency are also prevalent, and include goitre, anaemia, and Vitamin-A deficiency (Government of Eritrea, 1995). Efforts to increase services have centred on the highland region, where the majority of the population lives. The Ministry of Health is aware of the value of traditional medicine in Eritrea, although no steps have been taken to integrate modern and traditional health practices in the country (Shushan, 1995).

In the highlands, health care practitioners include TMPs, witchdoctors and ministers of the Christian church. TMPs are consulted for physical problems, while witchdoctors may be consulted to deal with spiritual disorders believed to result from witchcraft. Witchdoctors are generally viewed as evil, are feared by society, and operate in secrecy for fear of persecution (Shushan, 1995). As most people in the highlands are Christians, consultation with witchdoctors is discouraged, and people therefore treat psychological disorders or spiritual problems with holy water. In addition, problems that are perceived as not easily explained are treated either by witchdoctors or by the church and include sleepwalking, viral diseases, such as measles, and various psychological disorders (Shushan, 1995). TMPs are well respected, but often conduct business with a low profile so as not to be branded as magicians. Knowledge of traditional healing is usually passed down to one child in the family (Shushan, 1995).

Trade: Field research related to use of plants and animals for medicinal purposes in Eritrea has been minimal in recent years. During the Italian colonial era numerous studies were carried out (Oddo, 1996), and more recently some work has been undertaken in the area of phytochemistry and ethnobotany. A recent ethnobotanical study recorded commonly used medicinal plants in the highlands. This survey was carried out at four sites in the Akeleguzai administrative region in two small urban areas (Segeneiti and Senafe), and two small rural areas (Ahfisi and Adi ab'ur) (Shushan, 1995). Shushan (1995) reported that most TMPs collect the medicines they administered, and that most plants were gathered immediately prior to use - wildlife medicinals were seemingly traded on a small scale, with only a limited number of vendors selling medicines at central markets in urban areas. Over 100 species were documented as being commonly used in the study areas. It was noted that collection of information on plants used was difficult because people think that if the use of a medicine is revealed, then its efficacy is decreased.

Shushan (1995) analysed a total of 289 herbal preparations and found that leaves were by far the most-recorded plant part (in 131 preparations), seeds, roots, fruits, bark, bulbs, tubers and flowers being used in 36 or fewer preparations. Most of the plants used in Eritrean traditional medicine were said to be collected from the wild, although some are cultivated as live fences and hedges and for other purposes. Some of the species used are reportedly becoming scarce (Shushan, 1995).

According to Shushan (1995), the eight species which were used most often, in order of importance, were: *Meriandra benghalensis* (for its leaves), the narcotic and diuretic *Withania somnifera* (for leaves, roots and stem), *Schinus molle* (leaves), *Lepidium sativum* (seeds and leaves), *Cucumis figarei* (roots and leaves), *Cadaba farinosa* (leaves), rue *Ruta chalepensis* (leaves), and *Aloe camperi* (leaves). None of these species is regarded as being of conservation concern. The so-called pepper tree *Schinus molle* is an introduced species that is widely cultivated, and *Cadaba farinosa* is quite common in arid areas (Bein *et al.*,1996). *Aloe camperi* and *Withania somnifera* are regarded as common in Eritrea (Ghebrehiwet Medhanie, pers. comm. to N. Marshall, 1997); *W. somnifera* has a wide distribution extending from Africa to India, and it is cultivated in several countries, including China (D'Arcy, 1986). *Lepidium sativum*, known as Garden Cress, has a wide distribution (Egypt and west Asia) and is also cultivated as a salad plant (Anon., 1976). *Ruta chalepensis* is widely cultivated in the highlands (Shushan, 1995).

Shushan (1995) notes that Eritrean traditional medicine does not rely exclusively on plants, but also incorporates animal and mineral ingredients. Hagos (*in litt.*, 1996) reports that animal medicinals are rarely available in medicinal markets in Eritrea. This is possibly a result of hunting pressure over the past 30 years, which has led to a decline in the populations of most animal species. Hagos *in litt.*, (1996) and Moehlman (1992) report nine animal species in use in Eritrean traditional medicine (see **Annex 1**). Of note is reported use of the critically endangered African Wild Ass, whose meat, blood and fat are used to treat a variety of ailments (Moehlman, 1992). Medicinal use may also represent a serious threat to two subspecies of warthog, the Somali Warthog *Phacochoerus aethiopicus delameri*, and the Eritrean Warthog *Phacochoerus africanus aeliani*. The Eritrean Warthog is regarded as the most threatened subspecies of *Phacochoerus africanus*, and there is insufficient information about the extent of its presence in Eritrea, Ethiopia and Djibouti. Data are deficient also for the present distribution of the Somali Warthog (Vercammen and Mason, 1993).

Three animal species reported to be in use are not regarded as priorities. These are Olive Baboon *Papio anubis,* the Ostrich, which is not being threatened in Eritrea, although the Sudanese population is included in CITES Appendix I, and the African Elephant *Loxodonta africana*. The African Elephant is reported to be in use only for its dung (to treat skin cancer), and in this case, medicinal use does not pose any threat to Eritrea's very small elephant population, which spans the border with Ethiopia.

***International trade*:** Minimal information is available on international trade in wildlife medicinals into or out of Eritrea. In the past, Eritrea was an exporter of Senna *Cassia senna* (the pods and leaves used as a laxative), but during the war years this trade ceased and has not resumed. Some *Aloe* spp. may be exported to Ethiopia (Desalegn *et al.*, 1996). There are reports of the export of sea turtle genitalia to Saudi Arabia, and sale of Eritrean sea turtle products has been reported in Riyahd (Joubert, *in litt.*, N. Marshall, 1997).

Legislation: Framework environmental legislation has been drafted, and is awaiting approval by Parliament (A. Skjold, pers. comm. to N. Marshall, 1997). Eritrea is a Party to CITES.

Conservation: Eritrea's natural resources have experienced intense pressure over the last few decades. Drought and war in particular have led to land degradation and over-exploitation of numerous species. Analysis of information from sources knowledgeable about the conservation status of animal and plant species, including Shushan (1995), and the Ministry of Agriculture (Government of Eritrea, 1995), which has compiled a list of threatened plant species, has led to a number of species in Eritrea regarded as meriting conservation concern (**Table 4**). Although only three plant species are listed in the table, and these because they are harvested for parts that would jeopordize the life of the whole plant, it should be noted that Eritrea's vegetation has experienced an overwhelming decline, and that exploitation occurs for fuel, fodder, timber, fencing, and food, as well as for medicine. It has therefore been difficult to identify species declining primarily because of medicinal use.

Several medicinally valuable plant species are regarded as fairly common by some but as threatened by others and may accordingly merit further investigation (Government of Eritrea, 1995; Hagos *in litt.*, 1996; Ghebrehiwet Medhanie, pers. comm. to N. Marshall, 1997). These are: *Albizia anthelmintica*, *Boscia angustifolia*, *Cordia africana, Maytenus senegalensis*, *Rhus glutinosa* ssp. *abyssinica,* and Tamarind *Tamarindus indica*. In addition, two species harvested for parts in a way which does not damage the whole plant irreparably have been omitted from the list, although there seems to be agreement that their numbers are declining. These are *Boswellia papyrifera*, valued for its gum, and *Dobera glabra*, the twigs of which

Table 4

Medicinal plant and animal species reportedly of conservation concern in Eritrea

Species	Life form	Part used	Use	Reason	Distribution
Adansonia digitata	tree	bark, root		very poor regeneration; recorded as threatened in Eritrea	widespread in Africa
Balanites aegyptiaca	tree	bark, fruit, root	stomach and gynecological problems, used as a purgative	population is reduced: recorded as threatened in Eritrea	widespread; also used as food, fuel, forage, soap and timber
Juniperus procera	tree	bark, leaves, twig, bud		becoming scarce	occurs in eastern Africa; also used for timber and posts
Chelonia mydas Green Turtle	reptile	genitals	aphrodisiac	Endangered (EN A1abd); international trade to Saudi Arabia	widespread
Crocuta crocuta Spotted Hyena	mammal	lips	aphrodisiac	reported to be vulnerable in Eritrea	widespread in Africa
Equus africanus African Wild Ass	mammal	fat, blood, meat	TB, backache, rheumatism, constipation, bone-ache and mineral deficiencies in livestock	Critically Endangered (CR A1b)	occurs in Eritrea, Ethiopia and Somalia
Panthera pardus Leopard	mammal	claws	to protect against evil spirits and prevent miscarriage	reported to be endangered in Eritrea	Africa, Asia, Middle East but exterminated or threatened in most places outside Africa
Phacochoerus aeth -iopicus delameri Somali Warthog	mammal	blood	pneumonia	Vulnerable (VU A2cd, B1+2acd)	Kenya, Somalia, Eritrea (?)
Phacochoerus africanus aeliani Eritrean Warthog	mammal	blood	pneumonia	Endangered (EN A1acd, B1+2abd)	Eritrea, Djibouti
Civettictis civetta African Civet	mammal	musk	urinary problems	reported to be endangered in Eritrea	sub-Saharan excluding southern S. Africa

Source: Bein *et al.*, 1996; Azene *et al.*, 1993; IUCN, 1996a; Government of Eritrea, 1995, Moehlman, 1992; Shushan, 1995.

are used as toothbrushes. Both species are reported to be experiencing population declines, and both are harvested for a variety of non-medicinal purposes, including for fodder, fuel, and fencing.

The three medicinal animal taxa in trade in Eritrea which appear to merit highest concern are the Green Turtle *Chelonia mydas*, for which the trade in genitalia to Saudi Arabia may be large and is definitely in need of further investigation; the African Wild Ass, the precarious conservation status of which in Eritrea renders any harvest a grave threat; and the warthog.

Conclusion: Eritrea has a paucity of information about the conservation status of its flora and fauna. Minimal research has been carried out over the past 30 years, and the status of most species is likely to have changed during this period. Habitat loss, deforestation and land degradation have had a considerable negative impact on species valued as medicines. Government-administered health services are in the initial stages of recovery, and as a result reliance on traditional medicine in Eritrea remains substantial. Pressures on plant species in particular are numerous, as exploitation occurs for fuel, timber, fodder, and for a variety of other household uses. Eritrea has made efforts since the end of the war to implement natural resource conservation and management activities, yet much remains to be done to maintain or improve the status of resources in the country. Demand for wildlife medicinals is unlikely to decrease in the foreseeable future, and therefore efforts must be made to address population declines as well as health requirements. Plant species, especially trees, are suffering from pressures that could be addressed through habitat management measures, which include reservation and restoration of natural areas.

In order to determine the present status of plant and animal species in the wild, surveys and studies must be undertaken. In the light of findings of survey work for this report, control mechanisms should be considered to discourage indiscriminate or illegal harvest: a major shortfall in Eritrea's conservation and management progress is the lack of environmental legislation. Positive action must also be taken in the forms of stimulating resource management and cultivation of valued plant species.

Recommendations

- Investigate the status of the warthog in Eritrea, particularly the Eritrean Warthog, to ensure its conservation; ascertain whether there are two subspecies in Eritrea, and also the extent of harvest for medicinal use.
- Investigate the trade in sea turtle genitalia to ascertain the scale and potential impact on species.
- Promote actions leading to the conservation of the African Wild Ass.
- Promote propagation of valued medicinal species, particularly those tree species that are subject to multiple use pressures.
- Conduct a quantitative survey of the medicinals trade in Eritrea.
- Encourage passage of environmental legislation.

Ethiopia

Background: *Area*: About 899 750km^2 ***Population:*** Over 47 million, growing at a rate of 2.1% per year (IUCN, 1990). *Flora*: An estimated 5770 plant species occur with about a 10% level of endemism (IUCN, 1990).

This mountainous country contains patches of montane forest as well as bamboo, moorland and heath in the highlands. The lowlands are typified by dry bushland, Sudanian woodland in the west, and semi-desert areas in the east and north. Approximately 11% of Ethiopia is cultivated, primarily the highlands, while 37% is pasture. Ethiopia has been subjected to intense deforestation during this century.

During study for this report, 15 individuals connected with the practice of traditional medicine were interviewed, seven TMPs, five vendors, and three collectors of medicinals (Desalegn *et al.*, 1996). This research was conducted primarily in Addis Ababa and surrounding towns.

Medical context: As in many African countries, Western medicine is not widely available to the majority of the Ethiopian population. People are reported to feel more at ease with TMPs, and in the case of some conditions, such as STDs, haemorrhoids and leprosy, prefer to seek help from a traditional healer, rather than expose themselves immodestly to a modern physician. The high cost of Western medicine is undoubtedly also a contributing factor to the preference for traditional medicine (Desalegn *et al.,* 1996).

In Ethiopia, TMPs may be categorized into three main groups: herbalists; bone-setters; and traditional birth attendants. Other healers constitute a fourth category, which includes a variety of practitioners such as veterinary traditional healers and spiritual healers. While the herbalists primarily administer plant-based medicines, all categories of TMPs are reported to use both plant and animal medicines (Desalegn *et al.,* 1996). Within the Ethiopian medical tradition there exists great variation owing to the range of diseases resulting from a varied climate and topography. This variation is also the product of contributions from Ethiopia's many immigrants, who have incorporated elements of Arab, Christian, Muslim and Greek cultures. The Ethiopian system is nevertheless one that is regarded as integrated (Vecchiato, 1993).

The practice of traditional medicine is reported to be dominated by men, although women in some areas are knowledgeable about medicinals and practise "home-based herbal treatment". Women herbalists were found to be few in number, but at the same time greatly respected. In general, medicinal knowledge is passed down to the first son, and this knowledge is generally not shared with women, unless a family has no sons (Costentinos *et al.*, 1995).

In 1975, the Ministry of Health set up an office of traditional medicine, with the aim of conducting chemical screening of medicinal plants, co-ordinating activities regarding traditional medicine and carrying out a census of TMPs, as well as evaluating traditional medicines. However, little progress was made and interest in traditional medicine waned (Vecchiato, 1993). The relationship between traditional and modern medicine in Ethiopia is not harmonious as, in general, government medics have little regard for traditional medicine (Abbink, 1995). Some TMPs in fact fear persecution and do not practise openly (Vecchiato, 1993). Knowledge of the use of wildlife for medicines, as well as for other purposes such as cosmetics, is a practice that in many areas is being lost, according to Fetlework (1995).

The Ethiopian Traditional Medical Practitioners Association was established in 1987. The association seeks to promote traditional medicine, and maintains clinics where patients can be treated with traditional medicine. At present there are four clinics in Addis Ababa, two in Bale, and several small clinics in other towns. The association has a membership of 830 healers, vendors and collectors, all of whom are required to pay a membership fee. This fee varies depending on the member: collectors might pay ETB1-2 (USD0.15-0.30) per month, whereas a traditional healer might be asked to pay a far greater amount (Desalegn *et al.*, 1996).

Trade: A number of studies have been carried out to investigate the medicinal markets of Ethiopia. Kloos (1976/77) surveyed markets in Addis Ababa and nine towns in the region of central Ethiopia, and observed that plant medicines originated from many parts of Ethiopia, as well as from neighbouring countries. There

was a fair amount of variation in the plants recorded at markets, and this was attributed to climatic and cultural variations. Many plants used commonly for minor ailments were not traded, as they were easily collected within reach of users' homes, or were cultivated in gardens (Kloos, 1976/77).

The seven TMPs interviewed during field research for this report had all been several years in practice - some over 20 years. Only one TMP worked in a clinic. All the TMPs stated that they both gathered their own medicinal plants and bought some species from vendors, and used from ten to 100 different plant species. Their customers were, for the most part, local or from other districts, but one TMP reported to be selling internationally. The most frequently mentioned problems that TMPs dealt with were gonorrhoea and tapeworm (Desalegn *et al.*, 1996). Kloos (1976/77) also found that taenicides (for treating tapeworm infestation) were some of the most frequently administered medicines, a result of the practice of eating raw beef.

The five vendors interviewed (three male, two female) worked six to seven days per week. The vendors gathered their own materials, or bought from collectors, and occasionally imported medicinal plant species from neighbouring countries. They specialized in collecting anything from three to 45 different plant species. Their customers were principally from local and outlying districts with a few international buyers (Desalegn *et al.*, 1996).

Of the three collectors interviewed, two worked full time, and one part time, gathering only on market days. All the collectors noted that some species were easy to gather, while others were becoming harder to find in easily accessible locations (Desalegn *et al.*, 1996).

TMPs and vendors alike had noted an increase in business and a greater increase in STDs, specifically gonorrhoea. The oldest collector said he had noticed a decrease in availability of material over the past five years. A few TMPs reported diminished availability of some species and an increase in prices for the rarer ones (Desalegn *et al.*, 1996).

Information from TMPs, vendors and collectors all corroborated in terms of the species most used and most in demand in Ethiopian traditional medicine. **Table 5** presents eight medicinal plant species that were used, bought, and sold by all interviewed.

Also recorded in high demand were *Calpurnia aurea*, *Cyphostemma junceum, Ocimum lamifolium*, *Olea europea* ssp. *africana*, and *Ruta chalapensis*. Neither TMPs, vendors, nor collectors had problems with availability of these species, and when lack of availability was noted for other species, it tended to be caused by the distance one had to go to gather the species, rather than the scarcity of the plant itself. The Bale region was frequently mentioned as a productive but difficult area in which to collect plants. It was also noted that TMPs commonly had alternative medical treatments for conditions so that they were not reliant on only one species. One example noted was Spotted Hyaena *Crocuta crocuta* skin in place of *Silene macroselen*, which is used as protection against evil eye (Desalegn *et al.*, 1996).

Four TMPs said that they used animal parts in their medicinal practice. The following species were mentioned: African Rock Python, Nile Monitor Lizard *Varanus niloticus*, Spotted Hyaena and Leopard *Panthera pardus*. It was reported that Nile Monitor Lizard is not difficult to obtain (Desalegn *et al.*, 1996). A total of 26 other animal species are reported as used, in Dawit and Ahadu (1993) and Gelahun (1980). For a full list of animals reported to be used in Ethiopian traditional medicine see **Annex 1**.

Table 5
Medicinal plants reported in use by all traditional medicinal practitioners and traders interviewed in Ethiopia

Species	Life form	Part used	Use	Distribution and notes
Croton macrostachys	shrub/tree	sap, leaves, bark, root,	STDs, leprosy, worms, evil spirits	widespread; easily cultivated
Echinops kebericho	perennial herb or shrub	leaf, root seed	all-purpose	endemic
Embelia schimperi	small tree	fruits	purgative, vermifuge	east Africa; both cultivated and wild-collected
Hagenia abyssinica	tree	bark, root, flower	worms, eye disease, diabetes, migraine, syphilis, hypertension	occurs in tropical Afromontane forest, formerly common in Ethiopia, now sparsely distributed
Lepidium sativum	herb	seed	tapeworm asthma, fever headache	introduced exotic; cultivated
Rumex abyssinicus	perennial herb	root, whole plant	eczema, STDs haemorrhoids, diabetes	very common
Silene macroselen	herb	whole plant	evil eye	
Withania somnifera	shrub	whole plant, root, seed, leaves, fruit	evil spirits, epilepsy	very wide distribution from Africa through parts of Asia

Source: Azene *et al.*, 1993; Desalegn *et al.*, 1996; Edwards, 1976; Legesse Negash, 1995; Mesfin Tadesse, 1995.

***International trade*:** Survey work in Ethiopia for this report indicated that importation of medicinals into Ethiopia through formal channels is minimal. According to the Ethiopian Customs Department, no wildlife medicinals are legally imported into Ethiopia. However, interviews with officials in the Ministry of Health, and in particular with the Drug Inspection and Licensing Department, revealed that some medicinals are imported infrequently and in low volumes for personal use. Medicinal products were reportedly imported when unavailable in Ethiopia: an example given was that of *Cassia italica*, imported from Saudi Arabia. Some *Aloe* spp. (known locally as *Siber* and *Eret*), were said to be imported from Eritrea, Somalia, and various Middle Eastern countries. Aloe products on sale in Addis Ababa were sold in the form of extract which is hardened, black in colour, and cut into pieces for sale at approximately ETB3.00/g (USD0.42/g)

(Desalegn *et al.*, 1996). Although *Aloe* spp. are listed in CITES Appendix II, they apparently escape the attention of Customs officers in Ethiopia because the plant material in trade resembles small black stones.

The only significant recorded medicinal plant export from Ethiopia is that of *Catha edulis,* which is traded primarily for its properties as a stimulant. Export figures appearing in Ethiopian Customs Statistics reveal that in 1992 a total of 937 425kg were exported, of which approximately 96% went to Djibouti. In 1993, a total of 2 711 165kg were exported, nearly all of which also went to Djibouti. Other reported destinations include the Netherlands, Italy, UK, USA, Thailand, Saudi Arabia and Poland. It should be noted that although Somalia is not reported as a destination for Ethiopian *Catha edulis*, significant quantities enter the self-declared Republic of Somaliland on a daily basis through Hargeisa (A. Forbes, pers. comm. to N. Marshall, 1997). Given this omission, the existing statistics should be regarded with caution and definitely as an underestimate. Customers for medicinal products, both patients and wholesale buyers, reportedly included some from outside Ethiopia. One TMP interviewed had patients from Somalia, Egypt, Sudan, Kenya, Yemen and Israel.

International trade in wildlife medicinals in Ethiopia is dominated by the African Civet *Civettictis civetta*, which produces musk, and is used locally to treat asthma and urinary disorders. Musk is not exported for medicinal purposes, however, but for use as a base in perfumery. Musk is produced from the anal gland of the animal, and is valued for its ability to hold strong scents. The musk industry is regulated by the Ethiopian Wildlife Conservation Organization, which oversees the capture and ranching of civets, as well as the export of musk (Getenet, pers. comm. to N. Marshall, 1996; Hillman, 1987). All musk produced in Ethiopia originates from wild-caught civets. In 1995, there were reportedly 3790 civets held on 229 farms, primarily located in the south-western part of the country. Surveys carried out in 1993-1994 indicate that African Civet populations are healthy in Ethiopia, however surveys are still underway in certain parts of the country (Getenet, pers. comm. to N. Marshall, 1997). The species is not regarded as threatened by IUCN (Schreiber *et al.*, 1989; IUCN 1996a).

Musk is preferably extracted from male civets, as with females there is the possibility of urine mixing with the musk (Getenet, pers. comm., 1996). Civets reportedly live about ten years, but a more realistic figure for civets maintained in captivity for musk production is approximately two years, owing to the rigours of musk extraction and other factors such as disease (Hillman, 1987). Civets produce approximately 600-1000g of musk per year, if they are healthy. According to the Ethiopian Wildlife Conservation Organization, exports of musk from Ethiopia averaged 1139kg per year for the period 1984 to 1995. France is undoubtedly the biggest importer of civet musk, although other countries such as India, Japan and Poland appear in official trade statistics and other destinations reported by exporters include Germany and Sweden (Desalegn *et al.*, 1996).

The potential world demand for civet musk is estimated at 6000kg per year, and at present Ethiopia is the main supplier (Tesfaye, 1995). Given the world demand for musk, Ethiopia views their industry as one with potential for expansion. Population surveys are being carried out, and authorities are interested in exploring the potential for captive breeding, although at present no successful breeding of civets has taken place in captivity in Ethiopia. In contrast, scientists in China have had success in breeding the Chinese Civet *Viverra indica*, and report that the animals breed twice a year (Ding and Fu, 1986) and the Small Indian Civet *Viverricula indica* is also reared in captivity in India for production of musk used in religious rituals and for local medicinal purposes (Xavier, 1993). Problems associated with civet farming and the musk industry include insufficient knowledge on the part of the civet farmer to maintain healthy individuals. It has also been reported that the quality of exported musk has deteriorated and the product is occasionally adulterated

with substances such as butter, wax, banana and/or petroleum jelly (Anonis, 1997; Getenet, pers. comm. to N. Marshall, 1996).

Legislation: At present there is no legislation in Ethiopia that specifically relates to trade in wildlife medicinals. New legislation pertaining to wildlife is currently under development and review. Forests are regulated by *Proclamation No. 94/1994: Conservation, Development, and Utilization of Forests, 28th March 1994*. This proclamation sets regulations pertaining to forest ownership, management of state, regional, private and protected forests, use, transport and storage of forest products. Of particular relevance to medicinals are regulations that allow inhabitants to use State and regional forests for domestic purposes (in accordance with any management plan or directive in force), and permit the extraction of products from protected forest (although cutting of trees is prohibited). Transport and storage of forest products require a certificate of origin and destination for any products not specifically exempted from this requirement by the Ministry. Prohibited activities are defined and it is specifically stated that no person shall use or harvest *Hagenia abyssinica*, *Cordia africana*, *Podocarpus gracilior* and *Juniperus procera* from State or regional forests, nor cut any tree, nor use any products of these species. Relevant penalties and enforcement powers are specified in *Proclamation No. 94/1994* (EFAP, 1994).

TMPs are regulated by *Proclamation No. 100/1948: Medical Practitioners Registration Proclamation*, which sets regulations for practice and requires that practitioners be registered.

Ethiopia has been a Party to CITES since 1989.

Conservation: During surveys it was difficult to obtain substantive information on a species basis from TMPs and vendors, as secrecy is an important part of traditional medical practice. Plant species harvested for roots, bark or the whole plant, that were also recorded as being in demand, scarce, or difficult to obtain, included *Dracaena steudneri*, *Hagenia abyssinica*, and *Securidaca longipedunculata.*

Information about the availability of animal species was not possible to obtain, hence this is an area that requires further research. Literature review revealed that at least 30 animal species are used in Ethiopian traditional medicine (Dawit and Ahadu, 1993; Gelahun, 1980). These species are included in **Annex 1.**

Conclusion: Loss of habitat, especially as a result of the intense deforestation suffered by Ethiopia during this century, has undoubtedly affected wildlife populations, and reduced the quantity of plant and animal medicines available to the population. Traditional medicine remains paramount to the Ethiopian people because of its cultural acceptance, relative low cost, and accessibility. Scarcity of wildlife medicinals may be on the increase, yet owing to the secrecy surrounding traditional medical practice, collecting information on availability of certain medicines, and in particular on those becoming scarce, proved a difficult task. While it would be useful to devote efforts to collecting conservation status information on valued medicinals, it may be more sensible to address medicinal use as a whole by working with TMPs and others involved, including the Government of Ethiopia, to examine and develop strategies for encouraging sustainable use of medicinal resources.

Recommendations

- Investigate the status of those plant species reported as scarce and the impact of medicinal use on their status.
- Promote propagation of valued plant species.
- Completion of the Government of Ethiopia's survey of the African Civet population.

Country reports for east Africa

Kenya

Background: *Area*: 582 644km^2. *Population*: Over 24 million with an annual growth rate of 4.1%. *Flora*: An estimated 6500 plant species with approximately 265 endemics (IUCN, 1990).

The central highlands are characterized by a high population density with much of the land cultivated, while the north and east are dry bushland and the south filled with grassy plains. The coastal regions contain mangroves and some forest, while the west is mostly cultivated with a few remaining forest patches and some swamps along Lake Victoria. Forests are becoming degraded, and conversion of land for agriculture is reducing natural areas.

Twenty-six TMPs were interviewed during fieldwork for this survey, 12 in Eastern Province, eight in Western Province, and six in the coastal region (Simiyu *et al.*, 1996).

Medical context: Kenya has access to Western medical services in its urban centres and to a limited extent in the rural areas. In some parts of Kenya, especially in the arid north, Western medical services are scarce and limited to vaccination programmes and use of anti-malarials (Fratkin, 1996). Reliance on the services of TMPs in rural areas is high, and is attributed not only to the high prices of imported Western medicines and inaccessibility of clinics, but also to the fact that traditional medicine is regarded as effective, and is the preferred system for many illnesses (Fratkin, 1996; Ichikawa, 1987; Munguti, 1997). Simiyu *et al.* (1996) observed a tremendous demand for traditional medicine throughout Kenya, despite rising prices for herbal remedies and a decreasing number of traditional healers, as fewer young people take up the profession. Often Western medicine is taken in conjunction with traditional medicine (Sindiga, 1994).

TMPs are represented by the Kenya Herbalists Society (KHA) which has approximately 300 members. Many of Kenya's TMPs do not belong to this, or any other sizeable association, although some form small groups of three to five healers, which are completely unknown to the authorities (Muya, pers. comm. to S. Simiyu, 1996). The KHA promotes traditional medicine, encourages improved hygienic practices, serves as a forum for networking and exchange of information, and organizes seminars. The association also attempts to verify that TMPs are qualified, with the aim of exposing fraudulent practitioners (Simiyu *et al.*, 1996).

Of the 26 TMPs interviewed, several had been in business for over 20 years. For the most part, they collected their own specimens, although some reported purchasing supplies, and this trend appeared to be on the increase (Simiyu *et al.*, 1996). Cultivation by TMPs was not reported as widespread, although Obado and Odera (1992) observe that TMPs have played a leading role in tree planting, especially in the cases of *Alstonia boonei*, *Cassia siamea*, *Melia azedarach*, *Tecoma stans* and *Thevetia peruviana*. Although these species are exotic, they represent a good foundation for encouraging propagation of indigenous species.

Trade: Trade in medicinal plants in Kenya occurs on both local and international levels and this study identified a growing trend in both. In the urban centres, street herbalists are a common feature, while in rural areas the norm is for TMPs to travel from town to town coinciding with each town's market day. Some even schedule visits to other countries in the region where they have regular clients (Simiyu *et al.*, 1996).

As noted, vending of medicinal plants in Kenya appears to be a growing practice. While fewer young people are turning to TMP apprenticeships within Kenya, a rise in vendors, many of whom sell in market areas to

private citizens, is apparent. Their customers often have the knowledge to self-medicate or bring a prescription from a TMP to be filled. In western Kenya, many TMPs were found to employ collectors on a contractual basis to gather the materials that they required (Simiyu *et al.*, 1996).

Medicinals sold in markets appear in a variety of forms. Units of sale vary depending on the prescription. Liquid preparations are generally displayed in 700ml bottles (in re-used containers of a popular brand of fruit juice), and are dispensed by the spoonful or glassful. Powders are dispensed by the handful or cupful. Some well-established TMPs were found to administer materials in semi-processed form by metric weight, packaged in polythene bags. Most remedies were a mixture of various components (Simiyu *et al.*, 1996).

The number of medicinal plant species used in Kenya is very large, and the species used vary considerably between regions. During this survey, commonly traded species were documented for the three regions studied. A resultant list of 27 species appears in **Table 6**: it should be noted that there was not much overlap between regions. Other surveys carried out in past years have also documented frequently used medicinal plant species (Emerton, 1991; ICRAF, 1992; KWFT, 1984; Lubanga, 1991; Muasya, 1993; Obado and Odera, 1992; Thomson and Ochieng, 1993).

A total of 33 animals were reported or recorded as used for medicine during field research for this report. Those species identified were Buffalo *Synacerus caffer*, Nile Crocodile, African Elephant, Hippopotamus *Hippopotamus amphibius*, Leopard, Lion *Panthera leo*, Ostrich, South African Crested Porcupine *Hystrix africae-australis*, Leopard Tortoise *Geochelone pardalis*, and Burchell's Zebra *Equus burchell* (Simiyu *et al.*, 1996). In addition, it should be noted that there is an illegal international trade in Black Rhinoceros horn reported from Kenya (Simiyu *et al.*, 1996). While animal medicinals are available in markets, in many areas the specimens are not traded but rather are collected by individuals as needed (Emerton, 1991). In addition to the species recorded during this survey, Fratkin (1996) has documented the medicinal use of Nile Monitor Lizard fat in northern Kenya, Milner (1994) reports the use of hair and stomach contents of Tree Hyrax *Dendrohyrax arboreus* to treat coughs in the South-West Mau forest area, and Emerton (1991) has recorded the use of ten animal species in Kakamegà forest, including Maned Rat *Lophiomys imhausi*, Olive Baboon, Aardvark *Orycteropus afer*, and unidentified species of Duiker and Guenon. On the north-eastern coast and offshore islands, Gubelman and Kavu (1996) have recorded use of Green Turtle oil for its medicinal properties, which are believed to include the ability to cure over 40 ailments including scabies, whooping cough, tuberculosis and gonorrhoea. One large turtle can produce about 50 bottles of oil, and one bottle can last a household for over six months. Dugongs are also valued as a medicine, however their numbers have diminished in recent years (Gubelman and Kavu, 1996). A list of animal species reportedly used in traditional medicine in Kenya is presented in **Annex 1**.

***International trade*:** Recorded international trade in medicinal plants has been dominated by *Prunus africana* exports to France. Phytosanitary certificates issued by the National Agricultural Research Laboratory (NARL) indicate that these ran to some 800t in the period 1990-1995 while CITES export certificates indicate a further 300t in 1996 (the species was included in CITES Appendix II in 1994).

In addition, some 100t of leaves of *Centella asiatica*, a naturalized species (and pantropical weed) of Asian origin often grown as a cover crop, were recorded by NARL as exported between 1992 and 1995, 36t of this to France, the remainder with unrecorded destination.

Other species recorded by NARL as exported were in far smaller quantities. These were: the introduced American *Jatropha multifida* (50 g to Kuwait in 1990) and *J. podagrica* (21t to the Netherlands in 1990 and

Table 6

Most commonly traded medicinal plant species in Eastern Province, Western Province, and coastal Kenya

Species	Life form	Part used	Eastern	Western	Coast
Acacia stuhlmanii	tree	root, bark			x
Afzelia quanzensis	tree	root			x
Albizia anthelmintica	tree	bark (dried and fresh)	x		
Albizia versicolor	tree	root			x
Asparagus racemosus	woody climber	rhizomes	x		
Azadirachta indica	tree	bark, leaves	x		
Bauhinia thonnongii		bark		x	
Caesalpinia volkensii	tree	-		x	
Commiphora obovata	tree	root			x
Croton megalocarpus	tree	bark, root	x		x
Cussonia spicata	tree	leaves			x
Dalbergia melanoxylon	tree	root			x
Ekebergia resepelliana	tree	bark			x
Fagara macrophylla	tree	bark		x	
Harrisonia abyssinica	tree?	root			x
Lannea stuhlmanii	tree?	bark		x	
Mondia whitei	climbing shrub	root		x	
Teclea simplicifolia		stem, leaves	x		
Terminalia prunioides	tree	bark			x
Toddallia asiatica	prickly scrambler	leaves		x	
Vepris eugenifolia		root			x
Warburgia ugandensis	tree	bark		x	
Wedelia (=Aspilia) mossambicensis	herb	shoot, plant tops			x
Ximenia americana	tree	root		x	
Xylopia parviflora		root			x
Zanthoxylum chalybeum	tree	bark	x	x	x
Zanthoxylum usambarense		bark		x	

Sources: Agnew and Agnew, 1994; Mabberley, 1997; Simiyu *et al.*, 1996.

1991 and 50kg to Kuwait in 1990); the native vine *Cissus rotundifolia* (15kg dry root/leaf to France in 1994); the native orchid *Ansellia africana* (20 plants to UK in 1993); and the native tree *Dracaena fragrans* (200g, undated). None of these is regarded as of concern. All exported species with the apparent exception of the *Jatropha* spp. are reportedly valued locally for medicinal purposes (Kokwaro, 1976).

In the western area of Kisumu medicinals are apparently traded to Uganda (Obado and Odera, 1992).

Although undocumented in recent export records, there is known to have been a recent trade in *Aloe* extract from Kenya, despite the existence of a 1986 presidential decree banning the commercial harvest and export of aloes. Aloes are valued on the international market for use in cosmetics and healing lotions. In 1992,

1500kg of Kenyan aloe extract was confiscated in the USA as it was without appropriate accompanying documentation (Oldfield, 1993). The species of *Aloe* illegally exported from Kenya as reported by Oldfield, (1993) were primarily *Aloe secundiflora* and, occasionally, *Aloe turkanensis*. Several hundred plants are required to produce 20 litres of plant extract (L. Newton *in litt.* to S. Oldfield, 1992). For the most part, harvesting does not kill the plant but destruction has been noted in Baringo District. The 1986 presidential decree mentioned above encouraged cultivation of aloes but, according to Newton (1991), plantation establishment in the north has been based on transplanting wild plants, which has depleted some wild populations. Anecdotal information suggests that such exploitation continues in northern Kenya (S. Milledge, pers. comm. to N. Marshall, 1996), and there are also reports that exporters of gums and resins illegally include aloe extract in shipments leaving Kenya (A. Jama, pers. comm. to N. Marshall, 1997). Exporters occasionally label exports of aloes as "gum aloes" in the hope that export will be more likely to be approved for a commodity so described (Forest Department, pers. comm. to N. Marshall, 1994).

Significant exports of *Catha edulis* are reported from Kenya. The species is used in Kenya to treat malaria, coughs and general body ailments (Kokwaro, 1976). It is an important cash crop for Kenya, with exports going to Somalia on a daily basis. The shrub is primarily grown in the Nyambene region in central Kenya.

Legislation: Kenya is a Party to CITES, with membership effective since 13 March 1979. CITES requirements are implemented through the *Wildlife (Conservation and Management) Act, Cap 376 of 1976*, as amended in 1989. In relation to plants, this Act provides protection for those in National Parks and National Reserves only. The Act provides significant protection to animal species, not only in terms of protection within parks and reserves, but also with regard to trade and by requiring licences and permits (IUCN, 1986). *The Forests Act, Cap 385 of 1962* (revised in 1982 and 1992), addresses the protection, management, enforcement and use of forest resources on government land. The Act specifically prohibits certain activities within Forest Reserves, such as removal of forest produce, except with licence from the Minister of Forestry (IUCN, 1996b).

Other legislation pertaining to plants includes the *Plant Protection Act*. This addresses the control of pests and diseases, and is the chief plant quarantine instrument in Kenya. Under this Act, import or export of any plants or soil may be restricted or prohibited by the Minister of Agriculture. This Act further requires that phytosanitary documentation accompany all plant imports and exports from Kenya (Simiyu *et al.*, 1996).

Despite the existence of a number of legal instruments that pertain to plant trade regulation, the legislation is spread over several laws and no single law addresses plant conservation, management and regulation. Furthermore, according to Simiyu *et al.* (1996), interaction between government agencies to implement plant-related legislation would benefit from increased and improved collaboration.

In 1977, the *Medical Practitioners and Dentists Ordinance* was amended such that all TMPs are required to register with the Medical Practitioners and Dentists Board, and medical practice is prohibited without training and registration approved by this board (Okoth-Owiro, 1994). In addition to registration, TMPs must have a Certificate of Acknowledgment issued under the auspices of the Ministry of Culture and Social Services. Certificates are issued to TMPs who have been in practice for ten or more years and have proof of the benefits of their work. This certificate must be signed by the Provincial Administrator or Chief before the Culture Officer of the Ministry (Simiyu *et al.*, 1996). Some traditional medical practitioners feel that they are not regarded as professionals because they are not licensed by the Ministry of Health; all modern medical practitioners must be licensed by this Ministry (Muchiri, 1996). Other legislation affecting medical practice in Kenya includes the *Pharmacy and Poisons Act*, which regulates the activities of pharmacists and requires that they be registered (Okoth-Owiro, 1994).

Table 7

Medicinal plant species reportedly of conservation concern in Kenya

Species	Life form	Part used	Use	Reason for concern	Notes
Boscia salicifolia	tree	leaf, bark	backache, cattle diseases	widely harvested; becoming scarce	occurs from Ethiopia, south to Mozambique, fairly fast-growing
Caesalpinia volkensii	woody climber	leaf, root	malaria, eye problems, aphrodisiac	over-exploited and no longer available; imported from Uganda	
Harrisonia abyssinica	shrub or tree	root, bark	diarrhoea, STDs	widely harvested	
Kedrostis foetidissima	perennial climber	tuber, whole plant	measles	in demand	uncommon
Plectranthrus pseudom -arrubioides	succulent herb	whole plant	gastric ulcers, dysentry	over-harvested; difficult to get	locally common in Rift Valley
Prunus africana	tree	bark	prostate problems	extensive harvest for international trade	occurs in Afromontane forests, also valued as a timber
Rhamnus prinoides	shrub/tree	root, bark	headache, malaria	widely harvested	
Securidaca longipe dunculata	shrub or small tree	root	rhuematism, arthritis, insanity, painful joints	scarce and difficult to obtain	restricted distribution in Kenya
Steganotaenia araliacea	small tree	bark	fever	widely harvested; becoming scarce	seems to be common
Warburgia stuhlmanii	tree	bark	toothache, rheumatism	very scarce	endemic to coastal Kenya; exploited for timber
Warburgia ugandensis	tree	bark, root	stomach ache, chest pains, malaria, toothache, coughs	widely harvested; difficult to get; imported from Uganda; reported as vulnerable	East Africa; valued as a timber for construction and furrniture; fairly slow -growing
Zanha africana	tree	root, bark	constipation, fits, to ease childbirth	widely harvested, depleted in Kitui and Machakos	uncommon
Zanthoxylum chalybeum	tree	bark, root, leaves	emetic, malaria, sore throat, epilepsy	widely harvested; difficult to get	occurs from Ethiopia to southern Africa
Zanthoxylum gillettii	tree	bark	coughs	widely harvested	occurs in rainforests in W./E./S. Africa; valued as timber; planted in some countries (Uganda)
Zanthoxylum usambarense	tree	bark	chest pain, cough, malaria	widely harvested	used for furniture and construction

Source: Agnew and Agnew, 1994; Aketch, 1992; Beentje, 1994; ICRAF, 1992; Johns *et al.*, 1990; Kokwaro, 1976; KWFT, 1984; Lubanga, 1991; Muasya, 1993; Obado and Odera, 1992; Simiyu *et al.*, 1996.

Conservation: Field research conducted for this study and a review of literature have revealed a substantial number of wildlife medicinals in use in Kenya which appear in need of conservation or further research. These species are listed in **Table 7**.

Medicinal plant species reported to be declining because of harvest for timber include *Afzelia quanzensis* especially used for furniture manufacture, *Cordia africana, Olea europea* ssp. *africana* for wood carvings, *Prunus africana* for timber, veneer, and cross beams on telephone poles, and *Strychnos henningsii* (A.B. Cunningham *in litt.* to N. Marshall, 1997; M. Muga, pers. comm., to N. Marshall, 1998; Simiyu *et al.*, 1996).

The animal species most in need of conservation action is the Black Rhinoceros, under pressure from illegal harvest for its horn, and the Green Turtle *Chelonia mydas*, which is exploited for its oil. The extent of the sea turtle trade is unknown but illegal local and international trade is occurring and may be placing undue pressure on this species (G. Wamukoya, pers. comm. to N. Marshall, 1997).

Conclusion: Numerous conservation and development organizations as well as government agencies are involved in natural resource conservation in Kenya. Still, resource depletion is occurring in many parts of the country. Kenya's inhabitants remain reliant upon traditional medicine, in both rural and urban areas. With demand for traditional medicine high and natural areas shrinking, the trade in wildlife medicinals appears to have become increasingly commercialized. Other pressures, such as demand for timber and wood products, have contributed to the decline of some species with medicinal value.

In order to secure a sustainable supply of medicines, TMPs and consumers may need to cultivate some of the species that are experiencing declines, and to encourage environmentally sensitive methods of harvest. At present, TMPs in Kenya are not well-organized, as there is no association in existence to represent most of them. The formation of such a group would be a useful means of addressing resource depletion at a national level. Although Kenyan TMPs have not in the past banded together to address common needs, diminishing supplies may be the factor that they deem important enough to unite and act. Numerous organizations are present in the country to collaborate and co-operate, and there is the technical expertise in agriculture and forestry necessary to develop sustainable management initiatives.

Recommendations

- Conduct an in-depth survey of trade in animal medicinals.
- Promote artificial propagation among TMPs with the aim of averting increasing shortages of medicinal plants.
- Promote improved collaboration between NARL and government CITES-implementing authorities, in order to improve levels of accuracy in recording trade in CITES-listed specimens.
- Increase awareness at NARL of CITES in general, and the need to keep species-specific trade records.

Tanzania

Background: *Area*: 939 762km^2. *Population*: Over 26 million, with a 3.6% annual growth rate; 19% of the population is urban-based (IUCN, 1990). *Flora*: An estimated 11 000 plant species (IUCN, 1990). High levels of endemism of fauna and flora are evident, particularly in the coastal forests (Sheil, 1992).

Miombo woodlands predominate, and the north and north-east portions of the country host *Acacia/Commiphora* thicket and grasslands, as well as montane forest and Afro-alpine vegetation. The

coastal region supports lowland forest and mangroves. Wetlands and floodplains are present, especially in the western part of the country. Tanzania also borders three of the great lakes, Malawi, Tanganyika and Victoria, host to many endemic fishes and invertebrates.

During survey work for this report, four urban centres (Dar es Salaam, Tanga, Arusha and Moshi) were visited (Kahatano, 1997).

Medical context: Traditional medicine plays a very important role in Tanzania, not least owing to the high cost of Western medicine, consultation and hospital fees (Mulama, 1997) and the number of Western doctors per head of the population, compared with that of TMPs (see **Table 1**). There were more Western doctors per head of the population in 1979, when a ratio of one Western practitioner (including aides and assistants) to 18 000 people was recorded (Mshiu and Chabra, 1982). In 1982, there were an estimated 40 000 TMPs practising in the country (Hedberg *et al.*, 1982). Kabudi (1990) stated that at least 60% of the people living in the coastal regions relied on traditional medicine, and Matthews (1993) reported that most coastal villages have a resident TMP. Witchcraft is a serious concern in Tanzania and treatment of ailments related to sorcery form part of traditional medicine. In the period 1970 to 1988, approximately 3692 people reportedly died in witchcraft-related incidents in the country (Kilimwiko, 1996). In 1929, under British rule, witchcraft was outlawed under *The Witchcraft Ordinance, 1929*, and provision was made for traditional medical practice through the *Medical Practitioners and Dentist Ordinance, 1929*. Although traditional medicine was legal, no collaboration between modern doctors and traditional practitioners was permitted (Kilewa *et al.*, 1987; Swantz, 1984).

TMPs in Tanzania are represented by the Tanzania Association of Traditional Healers and Midwives (*Chama cha Waganga/Wakunga wa Tiba Asili Tanzania - CHAWATIATA*), although at present, only about 3000 TMPs are registered with this association (Kahatano, 1997). The association acts as a forum for exchange of ideas and also serves to influence government policy and legislation pertaining to traditional medical practice (Vulata pers. comm. to D. Kahatano, 1997).

In Tanzania, TMPs treat patients in clinics or from their homes. Medicaments primarily consist of plant material, but animals are sometimes used. Diseases which are most frequently treated in Tanzania by TMPs include malaria, STDs, diabetes, asthma, as well as gastrointestinal and gynecological problems (Kahatano, 1997).

Trade: A total of 98 plant and 12 animal species were reported to be in trade locally for medicinal purposes (Kahatano, 1997). Most TMPs interviewed had collected the plants they used themselves. TMPs located in Dar es Salaam and Tanga reported collection of plant material from Handeni, Korogwe, Pangani, Shinyanga and Sumbawanga Districts, and the mountain areas of Uluguru and Usambara. Collection practices varied. Some TMPs made just one journey to collect their supplies for the whole year, others were supplied by collectors, who also processed plant and animal material into powders. Powdered medicines were supplied to TMPs in 20-litre buckets, and generally priced at around TZS20 000 (USD34.00) per bucket (Kahatano, 1997).

Vendors of medicinals are present in most urban centres in Tanzania (Kahatano, 1997). In Dar es Salaam, two markets, Kariakoo and Kinondoni, hosted vendors of medicinals. About 70 vendors were recorded in Kariakoo market, most of whom were Maasai women selling powdered plant material packed into small chloroquine injection bottles, selling for TZS1500-6000 (USD2.5-10.2) per bottle. These vendors were supplied by Maasai men who transported plant medicines in 50kg sacks to the vendors, who then sorted and

prepared medicines for sale. In Kinondoni, there were about 20 vendors, the majority of whom were also female.

In Tanga, there were approximately 50 vendors situated in the market and near the bus station. Vendors included Maasai women, and men from the vicinity. Sources of medicines were reported as Muheza, Amani, Korogwe, and Handeni Districts and north-west Tanzania. Medicinals on sale were for the most part in powdered form, although roots, bark and liquid were available. For a chloroquine injection bottleful of medicine the price ranged from TZS200-4000 (USD0.33-6.6), prices lower than in Dar es Salaam, a difference attributed to relative proximity of collection sites (Kahatano, 1997). Arusha had about 20 vendors selling in the *Ngarenaro-Kambi ya Fisi* Market, and a few Maasai vendors were present at the bus station in Moshi (Kahatano, 1997).

Animal species recorded during this survey as reportedly used by TMPs or sold by medicinal vendors included: African Civet, Honey Badger *Mellivora capensis*, sea turtle, whale, Wildebeest *Connochaetes taurinus*, Burchell's Zebra, cowrie *Cypraea* sp., pangolin *Manis* sp., Lion, Four-Toed Hedgehog *Erinaceus albiventris*, tortoise, hare and the domestic donkey. The most commonly used medicinal animals recorded in use were said to be sea turtles (for their fat), whales (also for fat), Burchell's Zebra (for fat), and pangolin (scales) (Kahatano, 1997). Howell (1993) also reports the use of sea turtle products for medicinal use, in particular the oil, which is often used to treat hernias and sore muscles, and in Bagamoyo to treat earache. In the Tanga-Pangani area, a small local trade was observed in sea turtle oil, with possible trade to Kenya noted. On Mafia Island, fishermen reported that sea turtle numbers are decreasing (Howell, 1993).

Credit: V.L. Williams, Dept. of Botany, University of Witwatersrand

Pangolin on display in a shop selling traditional medicine

The African Civet, the skull of which is used to treat migraine, is also reported to be thought an essential ornament in the home of TMPs, usually hung in the room where the TMP practices. This would elevate the African Civet to the most commonly used animal in Tanzanian traditional medicine. At the same time, it is not known how often TMPs replace these skulls and so it is not possible to ascertain whether the quantity of African Civets harvested is higher than that of other species (Kahatano, 1997).

***International trade*:** Tanzania formerly exported medicinal plants, in particular extract of *Aloe*, but no information exists on trade levels nor species traded (Uiso, pers. comm. to D. Kahatano, 1996). International trade in medicinal plants is supposed to be regulated by the Tanzania Pharmacy Board, and although there have been anecdotal reports of illegal export of plants (Mahunnah, pers. comm. to D. Kahatano, 1996), it has not been possible to locate any written legislation pertaining to this issue, and therefore not possible to substantiate this allegation. One taxon thought to be over-exploited for international trade for the cosmetic industry is *Osyris* sp., which is harvested from the Kilimanjaro region. Other species that are known to be exported from the Tanga region for research into their potential against AIDS include *Acalypha fruticosa, Harrisonia abyssinica, Steganotaenia araliacea* and *Wedelia (=Aspilia) mossambicensis* (Kahatano, 1997).

Table 8

Medicinal plant species reportedly of conservation concern in Tanzania

Species	Life form	Part used	Use	Reason for concern	Notes
Acacia mellifera	small tree or shrub	bark	stomach ache, malaria, syphilis, sterility	reported as rare or declining by TMPs	occurs from north-east Africa to South Africa, also in Arabia; reportedly common
Acalypha fruticosa	shrub or small tree	root, leaf, stem	sores, rashes, toothache	heavily exploited; exported	north and east Africa
Cadaba farinosa	shrub	root	bilharzia	reported as rare or declining by TMPs	occurs in arid areas from west Africa, south to Angola, and across to east Africa, also in India; appears to be common
Dioscorea dumetorum	climber	root	bilharzia	reported as rare or declining by TMPs	occurs from Senegal to Ethiopia to South Africa
Ehretia amoena	shrub or tree	root, leaf	viral infections, sores, intestinal parasites	heavily exploited	occurs in east and southern Africa
Harrisonia abyssinica	shrub or tree	root, leaf	stomach problems, fever, insomnia, headache, tuberculosis	heavily exploited; exported	
Milicia excelsa	tree	leaf, root, bark	madness, infertility, hernia	heavily exploited	tropical Africa; valued as a timber
Steganotaenia araliacea	tree	root, bark	sore throat, snakebite	heavily exploited, exported	west, east and southern Africa
Wedelia mossambicensis	herb	root, leaf	gonorrhoea, sores, backache, viral infections	reported as rare or declining by TMPs; exported	

Source: Kahatano, 1997; Mbuya *et al.*, 1994; Ross, 1979

As noted above, there is possible trade in turtle oil from the Tanga region to Kenya (Howell, 1993). In addition, one Dar es Salaam-based exporter of *Prunus africana* has been located, and is reported to offer bark at USD2-10/kg. It is reported that the company in question harvests up to 120t per year, with likely source areas being the montane forests in the south (Mt. Rungwe and Mdando forest), in the Uzungwa mountains, and in the north (Mt. Meru and Mt. Kilimanjaro). No *Prunus africana* trade has been reported to CITES, despite the taxon's Appendix II-listing since 1995 (Cunningham *et al.*, 1997).

Legislation: Collection of, and trade in, medicinals in Tanzania is regulated through the *Forest Ordinance* and the *Wildlife Conservation Act of 1974*. The *Witchcraft Ordinance, 1929*, which prohibits witchcraft, is still in effect. Tanzania is a Party to CITES.

Conservation: During this survey, vendors and collectors of medicinals observed that collection now requires travelling greater distances, largely because of the increased number of collectors in the business and the subsequent scarcity of supplies. Plant species recorded as being of conservation concern are listed in **Table 8**.

Medicinal trade in animals thought to be of concern includes that in sea turtles, owing to their endangered status and reported decrease by local fishermen, and the trade in pangolins, as a result of high demand and unknown status. Two additional species merit attention, the African Civet, because of reported widespread use for decoration by TMPs, and Honey Badger, as it was reported by TMPs to be difficult to obtain. Populations of both of these species are not thought to be declining, but this should be verified.

Conclusion: Reliance on traditional medicine in Tanzania is significant, and there is no reason to suppose that it will decrease. TMPs and vendors of wildlife medicinals noted increased scarcity of certain species, and the need to travel greater distances to procure supplies. Reasons for such reports of increased scarcity are not clear and further research is needed. Actions to address conservation and management concerns have the potential to be dealt with by TMPs through healers' associations, but at present membership is low and therefore the infrastructure and network does not exist to act quickly and effectively on a nationwide basis. Similarly, government agencies charged with regulation and oversight of wildlife medicinals, including collection, management and trade, are hindered by lack of requisite legislation and information to implement effective policies and actions.

Recommendations

- Investigate trade of *Prunus africana* in Tanzania and prompt accurate reporting to CITES of international trade and the undertaking of non-detriment findings by CITES authorities.
- Clarify legislation related to international trade in plants, and promote co-operation between agencies to implement existing laws, especially for traded plants.
- Investigate local and international trade in sea turtle products.
- Assess the status of the African Civet in Tanzania.
- Bring together TMPs to promote conservation/management action.
- Encourage collaboration between the government and the medical community.

Uganda

Background: *Area*: 236 578km^2. *Population*: Approximately 17 million in 1989, growing at a rate of 3.4% per year (IUCN, 1990). Eighty per cent of the population live in rural areas (IIED, 1992).
Flora: Approximately 5000 plant species with 30 endemics (IUCN, 1990)

Much of Uganda's vegetation is grassland, although lowland forest occurs in the south and west, Sudanian forest occurs in the north, and the mountain areas host heath and moorland, montane and bamboo forest. Extensive wetlands and floodplains occur in the country and in particular near Lake Victoria and in the Nile Valley. Approximately 28% of the country is under cultivation (IUCN, 1990). Uganda has sustained tremendous depletion of its natural resources owing to internal political instability in the past, with a 1.5 to two per cent deforestation rate per year. According to IIED (1992), 96% of Uganda's energy needs are met by fuelwood.

Research in the field for this report (Amai, 1997) was carried out in Kampala and Jinja. Eleven markets were visited in and around these towns and 24 TMPs and 45 vendors were interviewed.

Medical context: The outstanding feature of Uganda's medical system is the co-operation between the Western and traditional medical systems. The Ministry of Health is working to include TMPs in their efforts to meet national objectives of increased medical care for the population, and TMPs are reportedly conferring with, and respected by, Western doctors more frequently than in the past (Amai, 1997). Interest in traditional medicine is on the rise, partly as a result of government encouragement, but also of improvement in hygienic practices and its lower cost relative to Western medicine. Some church leaders who are turning to traditional medical practice themselves, have encouraged others to follow suit. Collaboration between TMPs and Western health care workers is increasing to the point where in some places both traditional and modern practitioners work side by side to address a community's health needs (Tumwesigye, 1996). Both Makerere University Medical School and Mbabara University Science and Technology have courses on traditional medicine taught by TMPs (Amai, 1997). Nevertheless, some disdain for traditional medicine remains among the Western medical community (Amooti-Kyomya, 1994). This may be because traditional medicine often involves superstition, which is perpetuated by the practices of some TMPs, a state of affairs resented by those TMPs seeking to gain recognition for the scientific validity of their herbal preparations (Kyeyune, 1996).

A significant amount of research on traditional medical practice has been carried out in Uganda. For example, between 1991 and 1995, some 5000 TMPs from 24 districts were interviewed by researchers from the Natural Chemotherapeutics Research Laboratory (NCRL) to ascertain species of plants used and other aspects of their medical practices. NCRL estimated that their interviews of about 200 TMPs per district represented only one-third of the total number of TMPs, which they thereby estimated to be in the area of 24 000 (NCRL data, in Amai, 1997).

Uganda has a number of groups which represent TMPs. The two largest are *Uganda ne ddagala lyayo*, established in 1962, and Uganda Herbalist Association, established in 1963. Over the years, TMPs have found it beneficial to found smaller organizations at the district and regional levels, and by 1995, there were 11 different associations registered with the NCRL. The total number of registered TMPs was 6311, with the majority belonging to the two original groups (*Uganda ne ddagala lyayo* with 1850 members, and Uganda Herbalist Association with 1642 members) (Amai, 1997). These groups aim above all to promote traditional medicine within Uganda, to bring TMPs together, and to improve co-operation between TMPs, health agencies, and the government (Amai, 1997).

In Kampala and Jinja, 194 TMPs were recorded. TMPs, as well as vendors, reported an increase in business within the recent past: 50 of the 69 TMPs and vendors interviewed reported an increase in sales, ten reported a decrease, and nine reported that the situation was static. Rural practitioners charge small payments for their services while well-established TMPs in clinics charge as much as UGX5000 (USD4.50) per visit (Amai, 1997).

Trade: Wildlife medicinals in Uganda are traded both locally and internationally. Internal trade occurs in markets which are located in most urban centres in the country. The main markets are found in Kampala and the surrounding suburbs, as well as in Jinja, which is located 80km east of the capital. The Kampala and Jinja markets are open five to six days per week, with the majority of vendors selling on a retail basis. A total of 182 vendors were observed at the 11 markets visited in and around Kampala and Jinja. The largest markets among the 11 were Katwe Jubilee Park, in Kampala, with 50 vendors, and Jinja market, with 36 (Amai, 1997).

Vendors were primarily Baganda, which is the main ethnic group in the Kampala area, but eight of the 45 vendors interviewed originated from neighbouring countries (Tanzania, Rwanda, Kenya and Democratic Republic of Congo). The majority of vendors were men. It was noted that vendors not only sold, but also often practised traditional medicine. A total of 26 plant species and seven animal species were recorded as frequently traded and in high demand. Over 90% of the medicinals in trade had reportedly been wild-collected (Amai, 1997) but some TMPs are involved in cultivation programmes. For example, in Rukararwe, in south-west Uganda, members of the Bushenyi Meditrad Healer's Association have gardens for medicinal plants and are also trying to cultivate medicinally valuable forest tree species (Tumwesigye, 1996).

International trade: Uganda is an exporter of medicinal plants. The most significant exports are cultivated ginseng (species unknown), liquorice *Glycyrrhiza* sp. and Quinine *Cinchona* sp., although miscellaneous medicinal herbs are also exported. The Customs Department has records of some plant exports and these for 1994-95 are shown in **Table 9**.

Table 9

Recorded Ugandan plant exports, 1994 and 1995

Year	Plant export	Volume (kg)	Value (UGX)
1994	*Cinchona* bark	4865	7 267 731
1994	Liquorice root	13 335	59 092 099
1994	Other herbs	2400	2 681 600
1995	*Cinchona* bark	44 720	7 674 423
1995	Ginseng root	2150	8 422 918
1995	Other herbs	2850	13 276 783

Source: Uganda Customs Department data.

The Plant Quarantine Department at the Kawanda Agricultural Research Institute (KARI), which conducts inspections for phytosanitary purposes, has also recorded exports of medicinal herbs. Volumes and species exported are not reported however. Destinations of exports reported by KARI include UK, USA and Belgium (Amai, 1997). Plant material is primarily exported by two companies. In the past, Uganda exported *Prunus africana*, but this trade has now ceased (Cunningham *et al.*, 1997).

TMPs have reported illegal trade in medicinals to Kenya, DRC, Rwanda, and Tanzania, for local use and for export to Europe. Specifically mentioned was bark of *Prunus africana* exported to DRC in past years (Amai, 1997).

In addition to the international trade mentioned above, Uganda is currently considering a number of collaborative programmes to investigate medicinal plants to discover biologically active compounds as possible drug candidates.

Legislation: Uganda appears to have the vehicles in place to legislate for and monitor its plant and animal species. Two principal statutes exist to this end, the *Uganda Wildlife Statute No. 14 of 1996* and the *National Drug Policy and Authority Statute No. 13, 1993.* The first has jurisdiction over use of all wild plant and animal species, including migratory species passing through Uganda. It has the authority to list species as endangered, control alien species, and dictates conditions for granting of licences. The latter is concerned with the delivery of health care to the population and the supervision of drug use. This statute seeks to promote research of traditional and Western medicines and to oversee the proper manufacture and storage of drug materials (Amai, 1997).

Uganda's *Forestry Act of 1964* allows for the collection of forest products from forest reserves for personal use by local residents. This would serve as a viable measure towards conservation if it were strictly adhered to, but it has been badly abused (Amai, 1997)

Uganda is a Party to CITES.

Conservation: Natural areas are under intense pressure in Uganda. Scarcity of medicinal plants appears to be a growing problem, as many interviewed believed that cultivation must be carried out to secure supplies. During this study, 16 plants and three animals were documented as difficult to obtain, and therefore of conservation concern. The plant species are listed in **Table 10.**

In 1991, the NCRL identified 16 plant species that were regarded as threatened in parts of their range. Some of these are included in **Table 10**, but a number of these are cultivated in gardens for a variety of purposes, are common or easy to propagate, and so it is assumed that the NCRL is referring to declines of natural populations of these species, namely: *Carissa edulis, Dracaena steudneri, Erythrina abyssinica, Spathodea campanulata*, and *Steganotaenia araliacea.*

Animals recorded during this study as difficult to obtain were Lion, Ostrich, and Genet *Genetta* sp. It is unclear why the Genet was thought difficult to obtain, as genets are regarded as common in Uganda. Lion and Ostrich populations have declined because of habitat loss.

Karamura (1995) notes that many of the plants used by TMPs naturally occur in forests, and are becoming rare as a result of land clearance. Knowledge about medicinal plants typically differs between men and women, the former usually collecting plants from natural forest, the latter tending to cultivate medicinal plants in their gardens. Karamura (1995) believes that women will hold on to their knowledge of medicinal plants, while that of men will decline in parallel with diminishing forest areas.

Conclusion: The Government of Uganda has made efforts to conserve its remaining natural resources, and has encouraged research and action in this area. The NCRL is involved in documenting use of Uganda's medicinal plants and working with the traditional medical community to raise awareness about conservation,

Table 10

Medicinal plant species reportedly of conservation concern in Uganda

Species	Life form	Part used	Use	Reason for concern	Notes
Apodostigma pallens	tree?	root	high blood pressure, diabetes, malaria	reported as scarce	monotypic genus
Capparis erythrocarpos	climbing shrub	root		reported as scarce; widely harvested	
Hoslundia opposita	shrub	root	abdominal pain	reported as scarce	only three species in the genus
Lonchocarpus bussei	tree	stem bark, root bark		reported as scarce	east and southern Africa
Maytenus buchananii	shrub or tree	bark, leaves, root	ulcers, headache, abdominal pain	reported as scarce	
Maytenus senegalensis	shrub, small tree	root	ulcers, headache, abdominal pain	reported as scarce	
Pittosporum mannii	shrub or tree	root	unspecified	reported as scarce	west and east Africa south to Zimbabwe
Prunus africana	tree	leaves, root, stem bark		population is depleted	Afromontane forests from west to south Africa
Psorospermum febrifugum	shrub or tree	bark, root	skin problems, internal sores, psychological ills	reported as scarce; frequently traded	
Rauvolfia oxyphylla	shrub or small tree	root bark, stem bark	hypertension	reported as scarce, widely harvested	
Rauvolfia vomitoria	shrub or small tree	root bark, stem bark	hypertension	reported as scarce; widely harvested	
Rhus natalensis	shrub or tree	root	constipation	reported as scarce	west, east and southern Africa, Arabia
Rhus vulgaris	shrub or small tree	root	coughs, abdominal pain	reported as scarce	west and east Africa south to Zimbabwe
Securidaca longipedunculata	shrub or small tree	bark, root	insanity, abdominal pain, fever, worms, general body pain	widely harvested; reported as scarce	widespread from Uganda to South Africa
Warburgia ugandensis	tree	bark	coughs, malaria, skin diseases, vomiting, pains	reported as scarce	widely distributed in east and southern Africa
Zanthoxylum chalybeum	shrub or tree	bark	malaria, jaundice, constipation, anaemia	reported as scarce; widely harvested	occurs from Ethiopia to southern Africa

Source: Amai, 1997; Beentje, 1994; Katende *et al.*, 1995.

efforts which are vital to counteract the impacts of a growing population and continuing loss of habitat on medicinal resources in Uganda.. Land clearance and harvest for charcoal and timber, more so than harvest for medicinal use, are having a detrimental effect on wild medicinal resources. Uganda's TMP associations may provide a sound opportunity for stimulating awareness and action, and with the positive attitudes towards traditional medicine in the country at present, these associations could make significant progress in areas such as propagation of medicinal plants.

Recommendations

- Promote co-operation between agencies regulating international trade in medicinal species so that reporting and regulation are accurate and effective.
- Maintain trade records and circulate among agencies responsible.
- Raise awareness among exporters about Ugandan legislation.
- Encourage propagation of rare medicinal plant species among TMPs.
- Conduct education in sustainable harvesting.
- Investigate alleged illegal trade in plant materials.

Country reports for southern Africa

Zambia

Background: *Area*: 7 526 170km^2. ***Population:*** Over eight million (IUCN, 1990). Just under half (42%) of the population live in the country's urban centres (Njovu, 1993). The population growth rate is estimated at 3.8% per year (WRI, 1992). ***Flora***: An estimated 4600 vascular plant species in the country, with 211 endemics (IUCN, 1990). Zambia's vegetation is predominantly miombo woodland.

During field research for this report, surveys were carried out in the urban areas of Lusaka, Kabwe, and Ndola. Thirty-two TMPs were interviewed.

Medical context: Traditional medicine is extremely popular in Zambia and people living in both rural and urban areas rely on traditional medicines to maintain their mental, spiritual and physical health. Western medicine is unaffordable for most of the population and is often inaccessible to many living in the rural areas. The Government of Zambia recognizes that government-run clinics and hospitals are insufficient to deliver adequate primary health care to the entire Zambian population and, as such, it views TMPs as an important resource for both urban and rural dwellers. TMPs are therefore officially regarded as legitimate health care providers and as effective agents for expanding government health services (Muswema and Mpengula, 1997).

There are several associations of traditional healers in Zambia, the largest of which is the Traditional Healers and Practitioners Association of Zambia (THPAZ). Established in 1978, this association currently has a membership of over 35 000. THPAZ receives some financial support from the government, and members co-operate with the government to improve the effectiveness of primary health care initiatives (Muswema and Mpengula, 1997).

Zambian traditional medicine includes the use of both plants and animals. No thorough review of herbal medicine has been carried out in Zambia, although several studies have been undertaken among the Nyanja and Chewa people (Ministry of Health, 1977), the Bemba (Moore, 1940) and the Lunda (Turner, 1964). TMPs are categorized as either herbalists, spiritualists, faith healers or traditional birth attendants (Chime, 1990; Twumasi, 1984).

Trade: Trade in wildlife medicinals in Zambia was seen to be primarily local. This trade occurs at market places, where vendors set up stalls, yet far more prevalent is the practice of administering medicines from consultation rooms, in which two to five TMPs receive patients. Because of this prevalence of consultation rooms, rather than medicinal markets, as outlets for wildlife medicinals, this survey concentrated on interviews with TMPs. Of the 32 interviewed, the majority operated in the community in which they lived, although some TMPs originated from other countries, such as Malawi, DRC, Zimbabwe, or Angola (Muswema and Mpengula, 1997).

The majority of TMPs interviewed collected the medicines they used themselves, or had them collected by a member of the immediate family. Very few TMPs reported allowing people other than family to collect herbs for them. Certain taboos relating to collection are still in place, such as that excluding menstruating women from herb collection. If this taboo is violated the medicinal plants collected reportedly lose their power. This explains why TMPs prefer to collect their own supplies, and do not want to purchase herbs that have changed hands many times. As a result, purchase from market vendors is not preferred (Muswema and Mpengula, 1997).

Over 80 plant-based medicines were reported to be in use by interviewed TMPs, although each TMP used a different range of species. Only ten medicines were reported to be commonly used by at least five TMPs. These are listed in **Table 11**.

Of the species listed above, only *Sterculia africana* and *Cassia abbreviata* were considered not readily available. Most were deemed to be "very common". Several TMPs reported that the roots of the tree *Lonchocarpus capassa* were traded in large volumes (Muswema and Mpengula, 1997). This species is also valued for its timber and in some areas is declining because of harvest of wood to make carvings (Mulofwa *et al.*, 1994).

Animal species recorded on sale during field research for this report were: Puff Adder *Bitis arietans*, Nile Crocodile, Spotted Hyaena, Honey Badger, Aardvark, Lion, Leopard, African Rock Python, otter, electric eel, and blue honey bird). Information on parts used and uses are presented in **Annex 1**. No information was collected during this study, however, on frequency of sale or demand, as vendors were reluctant to discuss animal species and were aware of the illegality of possession and sale of animals in Zambia (Muswema and Mpengula, 1997). While only 11 species were recorded during this survey, it is likely that many more species are included in Zambian traditional medicine (G. Howard, pers. comm. to N. Marshall, 1997).

***International trade*:** Currently there are no known imports or exports of wildlife medicinals from Zambia. The Export Board of Zambia (EBZ) is not involved in any exports of wildlife medicinals (plants or animals). It is known, however, that samples of plants have been removed from Zambia for chemical screening in the USA.

Legislation: The most important law affecting traditional medicine is the *Witchcraft Act of 1914 (Cap 316)*, which originally prohibited the practice of traditional medicine. The Act was amended in 1967 to allow traditional medicine to be practised, although a prohibition on witchcraft remains, and is defined under Section 2 as "throwing of bones, the use of charms, and any other process or device adopted in the practice of witchcraft or sorcery..". Hence, various types of traditional medical practices remain illegal in Zambia (Muswema and Mpengula, 1997).

Table 11

Plants reportedly used by more than five TMPs of those interviewed in Zambia

Scientific or local name	Life form	Part used and purpose	Where collected	Reported status	No. reporting
Mpanga mayele		root; sore throat		readily available	11
Cassia abbreviata	tree	root; coughs, stomach pain	Chipata, Eastern Province	becoming scarce	8
Pericopsis angolensis	tree	root; headache	Chongwe	very common	8
Albizia versicolor	tree	root; coughs, backache, swollen knees, to improve sexual performance	throughout the country	very common	7
Mboshe		leaf		readily available	7
Brachystegia bussei	tree	root, bark; general tonic stomach ache	Lundazi, Malawi	very common	6
Diospyros kirkii	tree	root, coughs	throughout the country	common but not widespread	6
Sterculia africana	tree	coughs	throughout the country	moderately available	6
Ziziphus abyssinica	tree	root, bark, leaf; general tonic, love charm, chest pains	throughout the country	very common	6
Chimfumulo		root, bark, leaf; chest pains		readily available	5

Source: Muswema and Mpengula, 1997.

Other legislation which may have bearing on the activities of TMPs includes the *National Parks and Wildlife Act*, the *Forest Act*, and the *Plumage Birds Protection Act*. The *National Parks and Wildlife Act* specifically regulates the taking, possession, and trade in trophies and protected fauna. Licences are required for possession of protected fauna, and also for any fauna and flora obtained from a protected area. The *Plumage Birds Protection Act* prohibits the export or local sale of the plumage of wild birds, except for scientific or education purposes. The *Forest Act* regulates forestry activities in Zambia, including entry into protected forest areas. The Act also provides for the control of harvest, removal and processing of forest produce, and regulates the removal of forest products from Forest Reserves. This Act lists tree species which are "reserved", the harvest of which is regulated.

During this survey it was found that virtually all TMPs were aware that there are laws regulating the use and sale of animals and animal parts, and in particular that one should not be in possession of protected fauna without a licence.

Zambia is a Party to CITES.

Conservation: All plant medicines were recorded as collected from the wild, primarily within Zambia. Virtually all plant species recorded to be administered by TMPs are thought to be common or widespread in Zambia, although there are a few exceptions. Two commonly traded species, *Cassia abbreviata* and *Sterculia africana*, were recorded as being somewhat difficult to get, thereby indicating the possibility of increased scarcity, although this seems unlikely since both species are distributed from east Africa, south to South Africa, and occur in relative abundance. *Lonchocarpus capassa* has been reported to be in trade in large volumes, is traded for its roots, and is also a valued source of timber. *Pterocarpus angolensis* is traded for its roots and bark, but is also a very important timber species, and is under pressure from the timber trade. These last two-mentioned species occur over a wide area also, and are not under significant pressure in other parts of their range. It has not been possible to identify national priorities regarding animal species.

Conclusions: Zambia is fortunate in that the country is large and has not experienced the degree of population pressure and habitat degradation that its neighbours have. Most medicinal plant species are widespread and still regarded as common, and there is ample habitat for most animal species. The relationship between TMPs and the government is positive, with collaboration and co-operation the norm. It appears that threats to Zambia's medicinal resources may come from other areas, and *Lonchocarpus capassa* and *Pterocarpus angolensis* are good examples of species for which supply of medicinal material may possibly be affected by demand for timber.

Recommendations

- Investigate trade in *Cassia abbreviata*, *Lonchocarpus capassa* and *Sterculia africana*.
- Survey the timber trade in *Pterocarpus angolensis*
- Conduct a detailed survey of trade in animal medicinals to get a better idea of species involved and any impact of the medicinals trade on such species.

Malawi

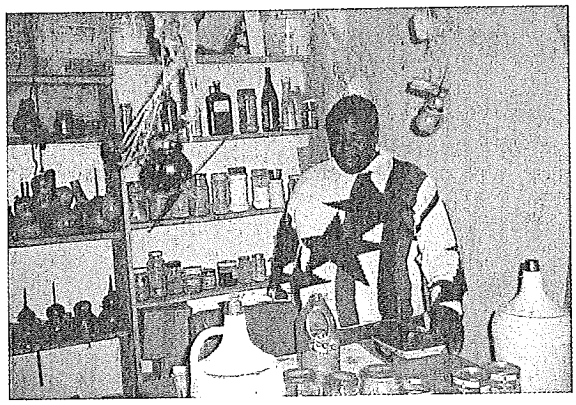
Background: ***Area***: 118 484km^2. ***Population***: Estimated to be ten million, with an annual population growth rate of 4.2% and an average population density of 85 people per km^2 (NSO, 1987). ***Flora***: 5409 species, composed of 212 cryptograms, 3750 dicotyledons, and 1447 monocotyledons (Maliwichi, 1997).

The economy is based on agriculture, and the majority of the population relies heavily on the country's natural resources for its food, forage, construction, medicine and energy needs.

A total of 20 medicinal traders in four urban centres - Blantyre, Lilongwe, Zomba and Mzuzu - were interviewed during this survey.

Medical context: The predominant medical system in use in Malawi is that of traditional medicine, especially in the rural areas. Limitations in government health services, such as drug shortages and an insufficient number of hospitals, as well as an unfavourable Western doctor to patient ratio of 1:50 000, have contributed to the reliance on traditional medicine. In contrast, the TMP to patient ratio is around 1:140 and many TMPs live in the rural areas where they are accessible to the people (Msonthi and Seyani, 1986). The government is reported to recognize the contribution of TMPs to the nation's health care and the benefits of collaboration between the modern and traditional medical communities (Hauya, 1997).

In Malawi, TMPs are categorized as either diviners, herbalists or spirit healers (Morris, 1991). Some traditional medicine associations exist, the largest of which is the Herbalists' Association of Malawi with about 2000 members (Maliwichi, 1997).



Credit: T. Milliken

The treatment room, where medicines are made and stored, inside a traditional medicine clinic in Lilongwe, Malawi

Trade: While markets exist in all major urban centres, there are no markets exclusively dedicated to sale of medicinals; stalls appear in markets that also sell goods such as food, clothing and other items (Maliwichi, 1997). However, most Malawians prefer to seek medical treatment in private, and therefore visit home-based TMPs, instead of purchasing products at the local market. Trade in wildlife medicinals is therefore difficult to document. Furthermore, it is believed that traditional medicine is more effective if administered in private (Maliwichi, 1997). At the same time, all four urban centres visited during this survey had experienced an increase in the number of market-based sellers of traditional medicine since 1989. In Blantyre, vendors had increased from eight to 27, in Lilongwe from three to nine, in Zomba from three to five, and in Mzuzu from two to three (Cunningham and Zondi, 1991; Maliwichi, 1997). Vendors who locate themselves in urban centres have the potential for greater earnings than those in equivalent business in the countryside: this may explain the rise in vendors at the urban markets over the past several years.

TMPs serve local as well as foreign customers in their homes. Foreign customers primarily come from neighbouring countries, but are known to come from as far away as Europe. Most vendors and TMPs collect the medicines that they sell or administer, except in the case of animal medicinals, which are usually purchased from hunters (Maliwichi, 1997). The majority of wildlife medicinals are obtained from the wild. Maliwichi (1997) documented the key forest areas that are the source areas for plants on sale in seven markets **Table 12**. Mulanje forest is still rich in medicinal plants, not having been subject to the same level of deforestation as other forests in Malawi.

Table 12

Markets and their reported source areas for wildlife medicinals

Name of market	Source forests for medicinals
Blantyre	Mulanje, Chikwawa, Mwanza
Limbe	Chikwawa, Mulanje, Chiradzulu
Zomba	Zomba, Mulanje
Lilongwe	Ntchisi, Chiradzulu, Dedza
Mangochi	Tete (Mozambique), Mangochi, Mwanza, Mulanje
Mulanje	Mulanje
Mzuzu	Mpherembe (Mzimba), Rumphi, Mzuzu

Source: Maliwichi, 1997.

Table 13

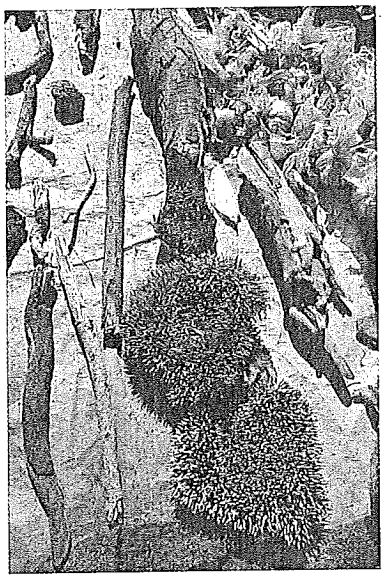
Medicinal plant species recorded as being sold in the largest volumes by medicinal traders in areas visited

Scientific name	Life form	Part used	Uses	Notes
Aeschynomene abyssinica	tree	root, bark	for predicting the future	scarce and imported from Mozambique
Calodendrum capense	tree	root	STDs, general body ailments	distributed from Uganda to South Africa
Cassia abbreviata	small tree	root, bark, leaf	STDs, snakebite, purgative	distributed from Somalia to S. Africa
Dicoma anomala	perennial trailing herb	root	good luck, purgative vaginal itching,	now difficult to get
Dolichos trinervatus	herb	root	aphrodisiac, vaginal itching, AIDS-related diseases, loss of eyelashes	widespread in Malawi
Erythrophleum suavelolens	tree	root, bark	protective charm, general body pains, love charm	difficult to get
Holarrhena pubescens	shrub	root, fruit	STDs, infertility, stomach, back and liver disorders, worms, spirit illness	widespread at mid- to low altitudes
Jateorhiza bukobensis	perennial climber	root	jaundice, general body ailments, piles, STDs, worms	heavily traded locally, also exported
Pyrenacantha kaurabassana		root	STDs, general body ailments	
Zanha africana	tree	root, stem	STDs, general body ailments	

Source: Maliwichi, 1997.

Species found to be traded in the largest volumes during field research for this report are listed in **Table 13**. The high volume of trade in these species is because of their popularity for treatment of prevalent and complex ailments. *Jateorhiza bukobensis*, *Cassia abbreviata*, *Holarrhena pubescens*, *Zanha africana*, *Dolichos trinervatus*, *Calodendrum capense* and *Pyrenacantha kaurabassana* are used for the treatment of STDs and general medical complaints, while the remaining species are regarded as efficacious protective and good luck charms. Volumes traded are difficult to ascertain, as many are sold in liquid form, while others are sold as powder.

Animal species are valued in Malawian traditional medicine, but TMPs state that parts from intentionally killed animals are powerless. While this would indicate that specimens are acquired by chance and that the supply might be low, observations reveal that intentional harvest to meet demand is likely for those species that are traded in high volumes, such as South African Hedgehog *Erinaceus frontalis* and Cape Pangolin *Manis temminckii*. As noted previously, most animal parts are acquired from hunters (Maliwichi, 1997). Animal species that were recorded as being frequently used are listed in **Table 14**.



Credit: A.B. Cunningham

Hedgehog *Erinaceus frontalis* skins are sold for symbolic medicinal purposes throughout east and southern Africa.

***International trade*:** Minimal information exists on international trade in wildlife medicinals in Malawi. According to the Malawi Export Promotion Council, in the past Malawi exported *Jateorhiza bukobensis* (root), *Strophanthus kombe* (seed), and the exotic *Cinchona ledgeriana* (bark). At present, however, no

Table 14

Frequently used medicinal animal species in Malawi as reported by traders

Scientific name	Common name	Part used	No. of traders reporting
Erinaceus frontalis	South African Hedgehog	quill, skin	8
Python sebae	African Rock Python	skin, back	4
Geochelone pardalis	Leopard Tortoise	shell, head, legs	4
Manis temminckii	Cape Pangolin	scales	4
Panthera leo	Lion	voice box	3
Loxodonta africana	African Elephant	skin, faeces	3
Panthera pardus	Leopard	skin	3
Hystrix africae-australis	South African Crested Porcupine	quill	3
Lepus whytei	hare	skin	2
Phacochoerus aethiopicus	warthog	teeth	2
Malepturuu electricus; *Gymnotus electricus*?	Electric Fish	body	2
unidentified	snail	shell	2

Source: Maliwichi, 1997.

Table 15

Medicinal plant and animal species reportedly of conservation concern in Malawi

Scientific name	Life form	Part used and use	Reason for concern	Distribution and notes
Aeschynomene abyssinica	herb or shrub	root and stem used for predicting future events and promoting successful business	sold in high volumes, now very scarce and imported from Mozambique	no substitute
Cassia abbreviata	small tree	root, bark and leaves, for STDs, snakebite and as a purgative	sold in high volumes; regarded as scarce	occurs in Zomba and Lilongwe; ten species in Africa
Dicoma anomala	perennial herb	root used for good luck charm, vaginal itching and as a purgative	sold in high volumes; regarded as scarce	no substitute
Dolichos trinervatus	herb	root used for AIDS treatment, vaginal itching, loss of eyelashes, as an aphrodisiac	sold in high volumes	widespread in grasslands
Erythrophleum suaveolens	tree	root and bark used for general body pains and as protective charm	sold in high volumes; regarded as scarce	tropical Africa
Holarrhena pubescens	shrub	root/fruit juice for STDs, headache spirit illness, infertility, worms, backache, stomach liver ailments	sold in high volumes	widespread; cultivated as an ornamental
Jateorhiza bukobensis	perennial climber	tuber used for general body ailments	sold in high volumes; exported; regarded as scarce	occurs in tropical Africa; only two spp. in the genus
Steganotaenia araliacea	small tree	root for protective charm	regarded as very scarce	no substitute; three spp. in the genus
Crocuta crocuta	mammal	tail used for protection against robbery	very high demand	no substitute

Table 15 continued

Scientific name	Life form	Part used and use	Reason for concern	Distribution and notes
Erinaceus frontalis	mammal	quill/skin for good luck or witchcraft	very high demand	a requirement for every TMP and vendor
Hystrix africae-australis	mammal	quills used to cure wounds resulting from bewitching	very high demand a requirement for every TMP and vendor;	no effective substitute
Manis temminckii	mammal	scales are good luck charm and to protect against bad omens	very high demand	no substitute
Panthera leo	mammal	voice box used for potency and bravery	high demand, rare	no substitute
Panthera pardus	mammal	skin for bravery, asthma	very high demand	no substitute
Python sebae	reptile	back for backache; skin for STDs	very high demand	no substitute

Source: Maliwichi, 1997; Morris, 1991; Williamson, 1975.

companies are formally exporting wildlife medicinals, and all export is by individuals on an informal basis, taking place outside the scope of official data recording processes. It was found that exports of the cultivated exotic *Azadirachta indica* and of *Jateorhiza bukobensis* do occur, particularly to neighbouring countries such as Zambia, Zimbabwe, Mozambique, and South Africa. In addition, some medicinal vendors have been observed preparing sizable shipments of many species of herbal medicines for export to South Africa. A total of 44 plant species were observed at the Limbe market in Blantyre being packed for a South African client (Maliwichi, 1997).

Exported animals were reported to include South African Hedgehog (skin), Cape Pangolin (scales), and South African Crested Porcupine (quills). Interviews with Customs officials at border posts revealed that the quantities traded are small (usually less than two kilogrammes), and difficult to regulate. Maliwichi (1997) reports that other types of wildlife medicinals may be exported unnoticed by Customs officials.

There is no official record of imports of wildlife medicinals into Malawi, although interviews with traders revealed that some manufactured products are imported from South Africa, and that *Aeschynomene abyssinica*, which was formerly abundant in Mangochi, is now scarce and imported from Mozambique (Maliwichi, 1997).

Legislation: Malawi's principal legislation governing conservation and management of wildlife resources is the *National Parks and Wildlife Act, 1992.* This Act is supported by numerous secondary laws enacted in 1993 that relate to trade in live animals, protected areas, ranching and control of trade in trophies, among other issues. The *National Parks and Wildlife Act* regulates harvest, possession, sale and trade in wildlife and contains a list of protected species of plants and animals. The *Forest Act, 1993*, provides for the establishment of forest reserves and sets regulations for conservation and management of forest reserves and removal of forest produce (Mulolani, 1996). Most government agencies are not concerned with trade in wildlife medicinals, and most believe that the trade has a low-impact on the species involved and is not cause for concern (Maliwichi, 1997).

Malawi is a Party to CITES.

Conservation: Maliwichi (1997) identified eight plant and seven animal species as meriting conservation attention (see **Table 15**). Of the animal species in the table, the Lion, Leopard, African Rock Python and porcupine are listed in the CITES Appendices.

Conclusion: Health care in Malawi is predominantly based on traditional medicine. Western doctors, clinics and hospitals are insufficient in number, while TMPs are numerous and well-placed to address the health requirements of the Malawian people. Demand for traditional medicine is coupled with a continuing reduction of natural areas, and the consequent decline in populations of plants and animals valued as medicines. As a result, Malawi now imports some of its medicinal material from neighbouring countries. The country is at the same time famous for its effective TMPs and powerful medicines, and caters to foreign patients and exports Malawian wildlife medicinals. Awareness about scarcity of plant medicines, in particular, is rising and there is potential among TMPs to join together to address conservation concerns. Reduced supply of required medicines is a common complaint, hence promotion of propagation may be an acceptable course of action for TMPs. Lack of awareness about existing regulations pertaining to trade is a concern, and efforts should be made to increase knowledge about legislation and how to implement it effectively.

Recommendations

- Promote increased awareness among government officials, including Customs officers, about the trade and existing regulations.
- Increase public awareness about conservation.
- Promote propagation of priority medicinal plants, and encourage government agencies to include medicinal trees in forestry and agroforestry extension programmes.
- Encourage TMPs to cultivate medicinal plants.
- Investigate the trade in plant species traded in high volumes.

Mozambique

Background: *Area*: 784 755 km^2, with a coastline measuring 2780km. *Population*: Estimated at over 15 million, with a growth rate of 2.6% (IUCN, 1990). *Flora*: Approximately 5000 species of plants, of which 219 are believed to be endemics (IUCN, 1990). Seven broad vegetation types have been identified, and include miombo woodland, mopane woodland, undifferentiated woodland, Afromontane vegetation, coastal mosaics, halophytic vegetation, and swamps (Bandeira *et al.*, 1994). Mozambique is characterized by a variable climate with precipitation ranging from 250 to 1800mm per year.

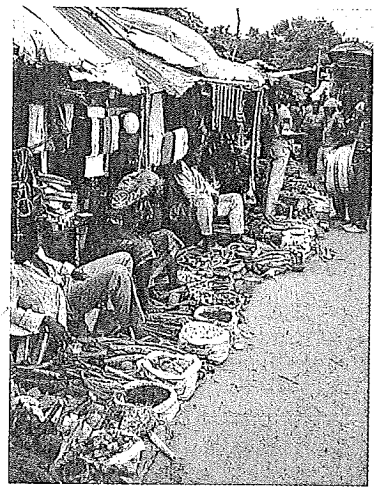
Surveys for this report (Bandeira, 1996; Guissamulo, 1996) were carried out in the towns of Maputo and Beira, Chimoio, Vilankulo and Inhassoro. Several vendors were interviewed.

Medical context: Healthcare in Mozambique is dominated by traditional medicine. Although Western medicine is available, its cost precludes use by the majority of the population. Decades of war also served to reduce access to Western medicine. It is estimated that per capita consumption of Western medicine amounts to a value less than USD1.00 per year, a figure that ranks as the lowest in Africa (Atal, 1993). Imports of Western medicine are valued at approximately USD2 million, a cost attributed to the lack of any manufacture of modern medicines in Mozambique. At the same time, the cost of traditional medicine is also out of reach for many, with about 60% of the population unable to afford traditional medical services (Atal, 1993). Maite (1987) postulates that few people have in-depth knowledge about which medicinal plant species to use and how to use them, and so poverty leaves many Mozambicans with only the most rudimentary of health care.

Compared to the ratio of 1:50 000 for doctors of Western medicine to patients (Green *et al.*, 1994), Cunningham (1995) has estimated that there are approximately 80 000 TMPs practising in Mozambique, giving a TMP to patient ratio of 1:200. These TMPs can be characterised as herbalists, diviners or traditional birth attendants. TMPs are registered through AMETRAMO, the Association of Traditional Healers of Mozambique, although in 1993 the number registered was only 25 000 (Atal, 1993). The Government of Mozambique is currently promoting the use of traditional medicine in an effort to improve the overall health of the population. Efforts to date have included the publication of books documenting species of medicinal value (i.e. Jansen and Mendes 1983a, 1983b, 1990, and 1991), and encouraging collaboration between TMPs and medical doctors through association in modern hospitals (Atal, 1993). The Government of Mozambique has in the past focused on increasing provision of primary health care to combat preventable diseases such as those caused by malnutrition, poor environmental hygiene, and economic underdevelopment (Madeley *et al.*, 1983).

Credit: A.B. Cunningham

A Tsonga diviner (*inyamnsoro*) digging out roots of *Maclura africana* in southern Mozambique



Credit: Rob Barnett

Wildlife medicinals at market in Maputo, Mozambique

Trade: Trade in medicines in Mozambique occurs at both local and international levels. Local trade in wildlife medicinals was seen to occur at local markets. In Maputo, there are three markets: the largest, Xipamanine, hosted approximately 30 male vendors of medicinals, all of whom had permanent stalls, while the two smaller markets had three or four vendors each (Bandeira, 1996). Apart from sales in the Maputo markets, public trade in wildlife medicinals in Mozambique is thought to be minimal: no wildlife medicinals were seen on sale at markets visited by Bandeira (1996) in Chimoio, Vilankulo and Inhassoro. People may collect medicines themselves for well-known domestic remedies, as well as taking medicines made from material gathered by TMPs. In addition to surveys of markets conducted for this report, a number of studies have been carried

out in recent years documenting the species available in the markets of Maputo (Cunningham, 1995; Fato, 1995; Versár and Petri, 1987).

In the three markets of Maputo, Bandeira (1996) recorded plant species regarded as being most in demand, which included: *Albertisia delagoensis*, *Ansellia africana*, *Cardiogyne africana*, *Dietes iriodes*, *Euclea natalensis*, *Warburgia salutaris*, and the unidentified *Ndzawaveja*. Of these species, *Ansellia africana* and *Warburgia salutaris* have been reported as threatened and in need of protection (Bandeira *et al.*, 1994). *Cardiogyne africana*, the roots and leaves of which are used to treat snakebite, occurs in Mozambique and Zimbabwe, but is not reported as being uncommon (Palgrave, 1977). *Euclea natalensis* has a wider distribution which also includes South Africa and Botswana, and is recorded as being widespread but scattered (Goldsmith and Carter, 1981; Palgrave, 1977).

Most of the herbal medicines on sale in Maputo had reportedly originated from southern and central Mozambique, but there were also reported imports from South Africa, Swaziland, Malawi and Zimbabwe. Virtually all medicinal materials are collected from the wild, with the exception of *Gladiolus natalensis*, which is cultivated (Bandeira, 1996; Cunningham, 1995).

In Beira, two markets were visited, and were found to have two male vendors of widlife medicinals each. No species were identified as being in high demand. Nevertheless, species of foreign origin were recorded, such as *Typha* spp., *Ndirire, Mutichi* and *Calibicano* from Zimbabwe, and *Calibicano* from Malawi. All species were found to be of wild origin except for Orange *Citrus sinensis* which is cultivated (Bandeira, 1996).

Guissamulo (1996) documented animal medicinals available in Maputo and Beira, and found 27 different species on sale in Maputo and ten in Beira. Maputo had over 20 vendors of animal medicinals, while Beira had only three. All vendors had purchased from suppliers: Maputo was reported to be supplied primarily from Maputo and Gaza Provinces, and Beira from Inhambane Province.

The most common medicinal animal species represented in the Maputo markets were: African Elephant, Aardvark, domestic sheep, Eland *Tragelaphus oryx*, Hippopotamus, African Rock Python, and Warren's Girdled Lizard *Cordylus warreni.* (Guissamulo, 1996).

***International trade*:** Exports of medicinal products have, in the past, included some ten different species, although since 1985 only three, *Jateorhiza palmata* and *Terminalia sericea,* and *Asparagus* sp. have been reported as exported (see **Table 16**) (Atal, 1993; Bandeira, 1996). Exports are primarily destined for

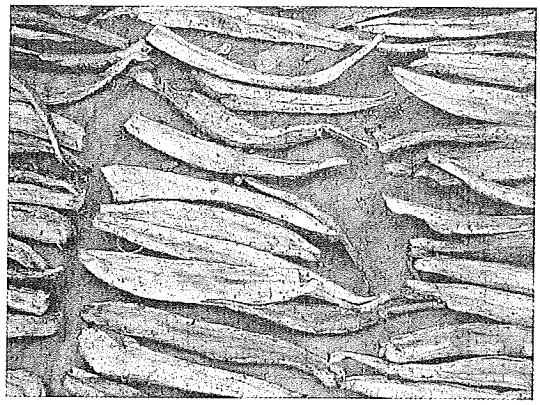
Table 16

Exports of plants from Mozambique, for the period 1985-1995 (metric tonnes)

Species	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Jateorhiza palmata	0.7	5.6	20	5	0.5	10	5	-	-	24*	5
Terminalia sericea	-	-	-	-	-	-	-	45	52	-	3
Asparagus sp.											20

Note: * = expected export as of December 1993 (Atal, 1993).
Source: Atal, 1993; Bandeira, 1996.

Germany, France and Belgium (Bandeira, 1996). *Jateorhiza palmata* may be subject to local over-exploitation and, according to Atal (1993), the market for it is expected to increase. The export in 1992 of 45t of *Terminalia sericea* bark is estimated to have affected about 2500 trees, and as such this species would benefit from management and research into coppicing potential (Cunningham, 1995).



Credit: A.B. Cunningham

Jateorhiza palmata tubers being dried before sale

MEDIMOC, a government company established in 1977, is the sole enterprise permitted to export medicinal plants, and their exports, besides the species just mentioned, have included: *Brackenridgea zanguebarica*, chilli pepper *Capsicum frutescens*, Lemongrass *Cymbopogon citratus*, *Gloriosa superba*, Devil's Claw or Grapple *Harpagophytum procumbens*, *Ricinus communis*, and *Tabernaemontana elegans* (Atal, 1993). *Capsicum frutescens* is introduced from the Americas and *Cymbopogon citratus* from India (Mabberley, 1997). Cunningham (1995) reviewed export figures and the likely impact of export volumes on species involved. He notes that *Cymbopogon citriodora* and *Ricinus communis* (a weed that grows on disturbed soils) are not of conservation concern, despite significant exports of seeds of *R. communis* (50t in 1982 and 200t in 1983). Exports of *Gloriosa superba* are not cause for concern, as the species is widespread in Mozambique. The species is amenable to cultivation and could be a good candidate for production in Mozambique (Cunningham, 1995; Mbewe, 1996). Of conservation concern is the export of *Brackenridgea zanguebarica,* a species which may be over-exploited, and *Harpagophytum procumbens* (exports of 9.9t in 1981 and 0.9t in 1982), thought to be over-exploited in Botswana and known to have a limited distribution in Mozambique (Cunningham, 1995).

Imported medicines include modern pharmaceuticals (worth USD2 million in 1991/1992), as well as crude herbal drugs originating primarily from South Africa, Europe (Portugal) and Central and South America (Brazil and Bolivia): these products are imported through MEDIMOC. The number of imported brand-name manufactured herbal products available in Maputo in 1993 was reported to be 228 (Atal, 1993).

Imported raw materials originate from numerous countries. Of particular note are the herbal raw materials from South Africa (*Alepidea amatymbica*, *Cassipourea* spp., and *Ndzawaveja*), from Swaziland (*Myrothamnus flabellifolius*), from Malawi (*Ndzawaveja*), and from Zimbabwe (*Mutichi*) (Bandeira, 1996). Animal fats imported from South Africa are available in Maputo. While some probably contain the stated ingredients, others, such as those called *Vembela, Sandawane*, and *Impundulu*, are fakes (Cunningham and Zondi, 1991; Guissamulo, 1996)

Legislation: Mozambique currently has no specific legislation aimed at conservation of wildlife medicinals, but a number of laws and regulations affect the trade in medicines. International trade in plant medicines is channelled through the government company MEDIMOC and the Government of Mozambique has made efforts to regulate the pharmaceutical market by overseeing the importation of drugs, which are restricted to approved pharmaceuticals only. This restriction led to a reduction in 1975 of the number of pharmaceuticals licensed for import, from 13 000 to 2600, and further to 1200 by 1980 (Barker *et al.*, 1980).

Mozambique is a Party to CITES.

Conservation: Information on the conservation status of wildlife in Mozambique is sparse for plants, although better for animals. Protracted warfare has precluded scientific research in large parts of the country, and the threat of land mines continues to deter biologists from carrying out field work in certain areas. Of the medicinal plants reported in trade, Bandeira (1996) identified *Ansellia africana*, *Warburgia salutaris* and *Rhus* sp., *Muverusso* and *Pontamo* as meriting conservation concern. Animal medicinals reported as being difficult to acquire included Lion, because of irregular supply; Cape Pangolin, because of occasional scarcity; Bushpig *Potamochoerus porcus,* owing to difficulty in hunting it; African Rock Python, owing to scarcity; African Elephant as a result of high cost and the illegality of hunting the species; Warren's Girdled Lizard because of scarcity; Aardvark, owing to the distances needed to travel to get it; and Shortspine Porcupinefish *Diodon liturosus,* owing to very high demand and difficulty in maintaining supply.

Conclusion: Decades of war have left Mozambique with insufficient formal health care facilities, and a high reliance on traditional medicine. Wildlife medicinals are generally available in Mozambique, although minimal information exists on the conservation status of these resources in Mozambique, especially in the case of plants, since field research has been impeded by civil strife. Certain species of large mammal have declined enormously owing to the war, but populations are beginning to rebound. Now that the country has entered a period of peace, assessments of the conservation status of habitats and species and in the wild can commence, in areas that are clear of landmines. As medicinal resources in neighbouring countries come under increasing pressure, it will become important for Mozambique to understand demand, both local and international, and to manage valued resources to ensure a sustainable supply.

Recommendations

- Investigate the status of most commonly traded species.
- Review impact of harvest on priority species.
- Examine resource of *Jateorhiza palmata*, to ensure sustainable export trade.

Botswana

Background: *Area*: Botswana is a large semi-arid country covering 600 370km^2. *Population*: Approximately 1.4 million, with an annual growth rate estimated at 2.53% in 1993 (Mbewe, 1996).

Eighty-four per cent of land in Botswana is typified by Kgalagadi sand supporting low savanna vegetation. Seventy-five per cent of the land is rangeland, and two per cent is covered by forest and woodland.

Research carried out for this survey (Mbewe, 1996) focused exclusively on the capital city of Gaborone and included interviews with five vendors of wildlife medicinals and two TMPs, and visits to ten pharmacies.

Medical context: Acceptance of traditional medicine is a relatively new phenomenon, with persecution having been the norm up to, and even after, the country gained independence. Persecution particularly pertained to diviners, who were regarded as witchdoctors whose activities were consequently prohibited. Traditional medicine is regarded now as an important and popular medical system, which has the approval of the government. Interaction is encouraged between TMPs and practitioners of Western medicine. (Mbewe, 1996).

Several traditional medicine associations are present in Botswana. Associations first came into existence in the late 1960s, largely the result of efforts by TMPs to gain legal and social acceptance (Staugard, 1985). In 1985, there were an estimated 3100 TMPs in Botswana, mostly in rural areas. According to Staugard (1985),

these were faith healers, herbalists, and diviner-herbalists in roughly equal proportions, and the majority were men. Staugard (1985) reported that about one-third of TMPs belonged to an association, and that more wished to have membership. In 1990, the number of TMPs recognized by the Ministry of Health was around 2000 (Moitsidi, 1993).

Trade: Trade in wildlife medicinals in Botswana takes place in both informal and formal sectors of health care. In the informal sector, medicinals are sold openly in markets, or are administered by home-based TMPs. The formal sector is more prevalent and in Gaborone it was observed that there are 23 retail pharmacies (formal sector shops) and two wholesalers selling wildife medicinals, and one company that supplies pharmacies locally and also exports *Harpagophytum* spp. and *Lippia* spp. (Mbewe, 1996).

During this survey, ten pharmacies were visited, of which seven sold local and imported plant and animal medicines, and three sold only local plant medicines. The two wholesalers mentioned above only dealt in imported medicinals, which came primarily from four South African companies. All medicinals sold in the pharmacies were sold as raw material, and marketed under their local names in the Zulu or Siswati languages of South Africa's Kwa-Zulu Natal Province and Swaziland. Local species sold in the pharmacies were *Harpagophytum* spp. (tubers), *Artemisia afra* (leaves), and *Lippia* spp. (leaves). The genus *Harpagophytum* consists of two species, *H. procumbens* and *H. zeyheri*. During this study it has not been possible to ascertain the quantities traded of each of the species. *Harpagophytum* spp. is used in traditional medicine to treat hypertension, diabetes, stomach problems and high blood pressure (Mbewe, 1993). *Lippia javanica* (for stomach disorders) and *Lippia scaberrina* leaves (for colds, coughs, and stomach disorders) are used in herbal teas (Mbewe, 1993).

There was a large number of plants sold in Gaborone's only open market, which included five vendors of medicinals among the food vendors. All five vendors were women, and they sold regularly at the market six days per week (Mbewe, 1996). All of them sold similar materials, which they said were collected locally, usually by themselves, although occasionally purchased from a collector. Plants formed the majority of medicinals sold at this market, with animal species not at all prevalent.

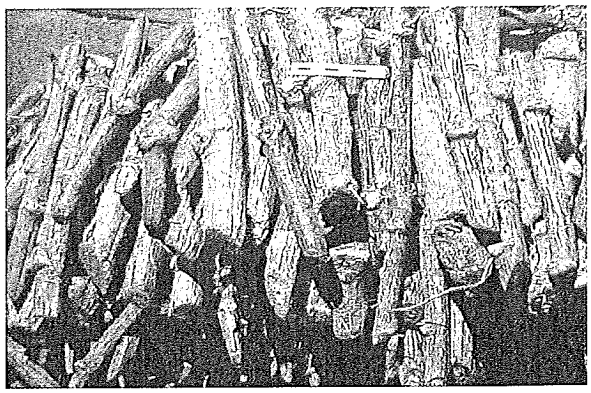
Two Gaborone-based TMPs were also interviewed during this survey. While both vendors and TMPs were reluctant to reveal the identity of the species in their medicines, a total of 72 plant medicines were named in the local language, 29 at species level (Mbewe, 1996). Eleven plants were discussed in detail with the vendors and TMPs; five were apparently always available (*Cassia abbreviata*, *Grewia flava*, *Grewia flavescens*, *Monontsane*, and *Tsikadithata*), while the remaining six were moderately difficult to obtain because they were only available seasonally, or because they were found in hills and other areas relatively difficult to access. These were: *Elephantorrhiza elephantina*, *Euclea undulata*, *Urginea burkei*, *Ximenia* spp., *Khalimela* and *Lulula*. No species was reported to be difficult to obtain simply because of scarcity, but the need to travel to distant places to collect could be an indication of decreasing supply (Mbewe, 1996). Local species reported to be in high demand by TMPs included *Harpagophytum* spp., *Cassia abbreviata*, *Ximenia* spp., *Grewia flava*, and *Grewia flavescens*. Both species of *Grewia* are traded for their leaves and branches, while the others are traded for their underground parts. Collection was primarily undertaken by the TMPs themselves, although some cultivation was practised.

Sale of herbs at stands, or door-to-door by "neo-herbalists", (a type of healer in Botswana selling alternative or homeopathic remedies), has also been noted (Staugard, 1985; Hedberg and Staugard, 1989).

Animals of local origin were not reported in high demand, but fats were used, sourced primarily from domesticated animals and were apparently the most frequently traded animal medicinal (Mbewe, 1996).

***International trade*:** The export trade in wildlife medicinals from Botswana is reported to involve only four to five plant species: *Harpagophytum* spp., *Artemisia afra*, *Lippia javanica* and *Lippia scaberrina* (Kgathi, 1988; Mbewe, 1996). The tubers of *Harpagophytum* are exported in both processed and unprocessed form. Only one company is currently exporting this taxon and it was not possible to obtain trade statistics from the company (Mbewe, 1996). Both species of *Lippia* and *Artemisia afra* are exported in processed form; *Lippia* is processed into tea bags and is known to be exported to South Africa (Mbewe, 1996).

A total of 123 types of imported medicine was recorded on sale with the ten pharmacies and two wholesalers visited, and 12 of these were said to be in high demand and included the plant species *Catha edulis*, *Alepidea amatymbica*, *Warburgia salutaris*, *Adenia gummifera*, *Celosia trigyina*, *Cymbopogon* spp., and the unidentified *Mahirisaka*, *Hlowalatsala*, *Serokolo*, and *Mfusamvu*. Vulture brain was also popular: vultures have been identified as a conservation priority in South Africa, where it is observed that all vulture species are used (Cunningham and Zondi, 1991). It is surmised that some of the medicinals imported from South Africa originated in Swaziland because of increasing scarcity of the materials in South Africa, although this has not been possible to verify (Mbewe, 1996). CITES-listed animal species advertised for sale in Gaborone pharmacies, believed imported from South Africa, included: Cape Fur Seal *Arctocephalus pusillus* (fat), African Rock Python, Samango Monkey *Cercopithecus albogularis*, Hippopotamus (fat), hyaena (unspecified), Lion (fat), and African Elephant (fat, dung).



Credit: A.B. Cunningham

A pile of stems of the sub-tropical forest climber *Adenia gummifera* on sale

Legislation: Botswana has no legislation specifically aimed at regulating the use and administration of wildlife medicinals, but legislation does exist to regulate TMPs. In 1927, the Protectorate Administration enacted the *Witchcraft Proclamation*, which was aimed at suppressing "witchdoctors", known in recent times as diviners (Staugard, 1985). Herbalists were exempted from this proclamation. *Proclamation No. 62 of 1934* required all medical practitioners, chemists, dentists, nurses and midwives to be registered, but exempted herbalists and native dispensers (Staugard, 1985).

Legislation aimed at managing and conserving plants and animals includes the *Forest (Declaration of Protected Trees) Order, 1981*, which, pursuant to the *Forest Act of 1968*, lists protected species on State Land. The *Forest Act* outlines regulations pertaining to activities in forests reserves and on State land, and also states that licences are required for removal of forest produce (IUCN, 1986). The *Wildlife Conservation and National Parks Act of 1992* consolidates all the laws relating to international trade in all animals, both CITES-listed and others, indigenous or exotic. The Act prohibits the hunting or capture of protected and partially protected game animals without a permit, and specifies controls for import and export of wildlife (Mbewe, 1996; Mulolani, 1996). The *Agricultural Resources Conservation Act of 1977* pertains specifically to *Harpagophytum*. This Act regulates harvest and trade of the genus, and requires that a permit be obtained prior to any export. To date, however, no export figures are held by the government, despite a continuing trade in *Harpagophytum* since enactment of the legislation in 1977.

Conservation: During this survey, reports of a growing scarcity of *Harpagophytum* spp. were heard. *Harpagophytum zeyheri* may be appearing in trade under the name of *H. procumbens* and the status and trade volumes for each of these species require further investigation, in the light of the conservation concern expressed for the genus.

This survey also documented the possible scarcity of six medicinal plant species: *Elephantorrhiza elephantina*, *Euclea undulata*, *Ximenia* spp., *Urginea burkei*, *Khalimela* and *Lulula*. However, *Euclea undulata* and *Ximenia* spp. have been reported as being common and widespread (Palgrave, 1977), hence it is likely that scarcity is because of causes other than population declines. There are two species in the genus *Ximenia* occurring in southern Africa: *X. americana* is pantropical, and *X. caffra* occurs in east and southern Africa (Mbuya *et al,* 1994; Palgrave, 1977). Likewise, *Elephantorrhiza elephantina* and *Urginea burkei* are not recorded as being under threat (Hilton-Taylor, 1996). Two imported species, *Warburgia salutaris* and *Alepidea amatymbica,* were said to be in high demand: both have been identified as being of conservation concern in other countries (*Warburgia salutaris* in Mozambique, South Africa, Swaziland, and Zimbabwe and *Alepidea amatymbica* in Lesotho, South Africa, Swaziland, and Zimbabwe).

Conclusions: The trade in wildlife medicinals in Botswana is both local and international, with significant imports of plant species, and probably of animal species, from South Africa. The export of medicinals is dominated by *Harpagophytum* spp. and also involves a few other plant species, but information on international trade in wildlife medicinals was difficult to obtain, and despite existing legislation, trade volumes are not known to the government. This is a concern not only from the conservation viewpoint but also from the regulatory perspective.

Trade in local species appears to be primarily in herbal medicines. While there is a number of good references documenting the identity of medicinal plants used in Botswana, further research would be useful to quantify trade volumes and conservation concerns, particularly in areas beyond the capital city. It appears that scarcity of wildlife medicinals is not yet a common concern among vendors and TMPs, and this is perhaps the result of low population density and consequent low demand. Nevertheless, the number of imported species on sale in Gaborone could be contributing to population declines in countries of origin.

Recommendations

- Promote capacity-building for Customs officers in order to improve implementation of existing legislation, and monitoring of the trade in *Harpagophytum* spp., particularly with regard to enforcing current legislation requiring export permits, and encouraging accurate recording of trade volumes.
- Review the trade and conservation status of *Harpagophytum procumbens* and/or *H. zeyheri*. Monitor harvest and trade to ensure these are sustainable.
- Investigate scope for improvement of regulation of imports, paying particular attention to imports from South Africa.
- Conduct research on medicinal markets outside Gaborone.
- Encourage the Government of Botswana to collect trade data on all plant species exported for medicinal purposes, including *Artemisia afra* and *Lippia* spp.
- Educate exporters about legislation pertaining to export of wildlife medicinals.

Zimbabwe

Background: *Area*: 390 759km^2. *Population*: Estimated at ten million in 1989, with a 3.6% growth rate (IUCN, 1990). *Flora*: 5000 vascular plant species, of which 500 are reported in use for medicinal purposes

(Gelfand *et al.*, 1985). Zimbabwe's vegetation is dominated by dry miombo woodland. Mopane woodland occurs in the Zambezi and Limpopo valleys. Montane grassland, heath, and forest occur in the upper elevations, particularly in the eastern highlands. There are approximately 16.8 million hectares of woodland, of which an estimated 80-100 000ha are destroyed for agricultural purposes each year (Mujakachi, 1993).

Markets in Bulawayo, Harare, Masvingo, Mutoko, and Murewa were visited during research in Zimbabwe for this report (Mukamuri, 1996). Forty-six TMPs and 34 vendors were interviewed.

Medical context: As the national health system is unable to deliver care to much of the population, and as traditional medical practice outlives its decline in colonial times, a greater proportion of Zimbabweans are receptive to traditional medicine (Chavunduka, 1994). Sixty to 70 per cent of all patients visit a TMP at one stage in their illness, especially if it is felt that forces other than the physical are involved (IUCN, 1988). The Government of Zimbabwe is collaborating with TMPs to improve the country's health care (Chana *et al.*, 1994).

Most TMPs are represented by the Zimbabwe National Traditional Healers' Association (ZINATHA), which was established in 1980. Prior to the establishment of ZINATHA, six small traditional medicine associations were in existence (Gelfand *et al.*, 1986), but these groups were characterized as weak, owing to poor leadership and lack of encouragement and support from the government (Chavunduka, 1986). ZINATHA was formed at a meeting called by the Minister of Health, and as such received full government support. The establishment of ZINATHA coincided with the dissolution of all the other traditional medicine associations (Chavunduka, 1986). In 1996, the total number of TMPs registered under ZINATHA was 52 500. It is estimated that there are an additional 5000 TMPs, who could be registered with a splinter association, Zimbabwe Traditional Healers Association (ZITHA). Of the TMPs registered with ZINATHA, an estimated 32 500 are women (Mukamuri, 1996).

Of the 46 TMPs interviewed for this study, 22 were women (Mukamuri, 1996). The TMPs, or *n'angas*, frequently began their practice in the rural areas and then moved to urban areas where they were able to make more money. They complained, however, of not being able to find accommodation in the city and of having to become "briefcase *n'angas*" and practise in the open air or at home. It is widely believed that many indigenous peoples have adopted the profession of healer for a better livelihood and that large numbers of immigrants who know little about traditional medicine are calling themselves healers to gain acceptance into Zimbabwean society (Mukamuri, 1996).

TMPs usually specialized in five areas: gynaecology, mysticism, general physiology, AIDS and other STDs. Most of the TMPs interviewed said they collected their own medicinal plants while 15% used a collector, but vendors noted that TMPs frequently have apprentices or assistants to collect for them (Mukamuri, 1996). Daneel *et al.* (1985, in Mukamuri, 1996) stated that some TMPs are unable to remember where they collect plants because they collect in a spirit state.

Trade: Twenty-two of the 34 vendors interviewed during field research were men (Mukamuri, 1996). Vendors ranged in age from 16 to 80. They stated that they sold to TMPs and frequently sold at retail level to customers without prescriptions. This was cheaper for local patients. The largest areas for selling were in city markets and, in Bulawayo, vendors were found in women's toilets, so as to serve women privately (Mukamuri, 1996). A few collectors, who were neither TMPs nor vendors, were interviewed. They did not have licences to collect medicinals legally.

In five markets canvassed in Harare, Masvingo, Mutoko, and Murewa, most vendors sold daily: opinion was almost equally divided among them on the question of whether business had declined or grown in the recent past. Two hundred medicinal plant species were mentioned during the market survey, although 14 of the vendors interviewed usually dealt in no more than ten species. The medicinal plant species reported to be most frequently used by TMPs and sold by vendors are presented **Table 17**.

According to Mavi (1996), several of the species in **Table 17** are threatened in Zimbabwe. These are: *Albizia antunesiana*, *Cassia abbreviata*, *Dicoma anomala*, *Elephantorrhiza goertzii*, *Eriospermum abyssinicum*, *Pterocarpus angolensis*, *Rauvolfia caffra*, *Securidaca longipedunculata*, *Spirostachys africana*, and *Warburgia salutaris* (Mavi, 1996). As most of these species are widely distributed and common in parts of their range, declines are thought to be localized.

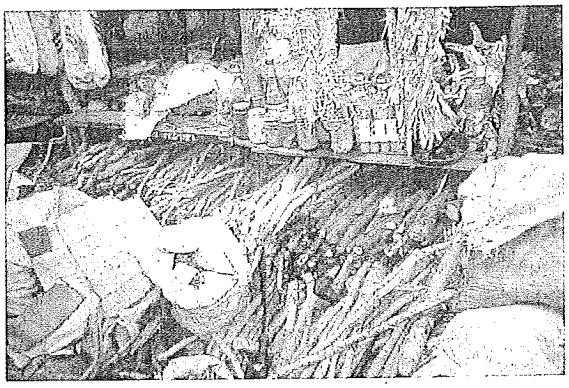
Table 17
Medicinal plant species most frequently administered by TMPs and sold by vendors

Species	Life form	Part used	Named by healers	Named by vendors
Albizia antunesiana	tree	root, bark, pod		x
Ampelocius obstusata		root	x	
Cassia abbreviata	tree	root, bark, pod		x
Cassia singueana	tree	root, bark		x
Dicoma anomala	perennial herb	tuber	x	x
Elephantorrhiza elephantina	geophyte	tuber	x	x
Elephantorrhiza goertzii	geophyte	tuber		x
Ekebergia capensis	tree	root, bark		x
Eriospermum abyssinicum		-	x	
Gomphocarpus glaucophyllus		-		x
Myrothamnus flabellifolius		stem, leaves		x
Ozoroa reticulata	tree	root, pod, leaves	x	x
Pittosporum viridiflorum	shrub or tree	root, bark		x
Pouzolzia hypoleuca	shrub	root, bark		x
Pterocarpus angolensis	tree	bark, fruit		x
Rauvolfia caffra	tree	root, bark	x	
Rubia cordifolia	tree	-		x
Securidaca longipedunculata	small tree	root, bark	x	x
Spirostachys africana	tree	bark, root, stem	x	
Stereospermum kunthianum	tree	leaves, bark		x
Sutera burkeana		whole plant		x
Warburgia salutaris	tree	root, bark	x	
Xeroderris stuhlmannii	tree	root, pod, bark	x	

Source: Mukamuri, 1996

Additional medicines frequently used or sold, but which is was not possible to identify, were *Masungure* (root) and *Zvanamina* (root, bark). Of the 200 species documented during this survey, all were reported as being collected from the wild, with the exception of Mango *Mangifera indica* and *Melia azaderach* (Mukamuri, 1996).

TMPs were reluctant to discuss their medicines in detail, but nevertheless disclosed that most were made from roots or bark and only a small proportion from leaves, stems, or whole plants. Almost all were sold in dry form. Around one-third of vendors questioned claimed to have an international clientele. TMPs in urban areas kept large supplies of medicines, a few as many as 50 500-ml bottles of plant materials.



Credit: A.B. Cunningham

Typical traditional medicines stall, showing extensive use of roots on sale, Mbare market, Zimbabwe

Animal parts are important in traditional medicines for symbolic as well as medicinal reasons and are used for ornament: in the past, TMPs wore clothing made from Lion or Leopard, but these species are difficult to acquire and the species now used are most often antelope, Serval Cat *Leptailurus serval* or some other small mammal (Gelfand *et al.*, 1986). All species recorded during surveys for this report were reported as becoming more difficult to collect, owing to regulations imposed by the Department of National Parks and Wild Life Management (DNPWLM). Nevertheless, during this survey over 25 different types of animal were observed to be on sale in the markets of Harare, Masvingo, Mutoko and Murewa. Most animal medicines were observed at market in Harare, and reportedly included baboon, Cheetah, Lion, Leopard, South African Crested Porcupine, African Elephant, Cowrie *Cypraea* sp., monkey, Klipspringer *Oreotragus oreotragus* Ostrich, African Rock Python, Aardvark, stork, tortoise, warthog, the domestic sheep, goat, horse, and cow, as well as medicines of unidentified animal origin (Mukamuri, 1996). Animal species valued as medicine in Zimbabwe are listed in **Annex 1**.

International trade: International trade in wildlife medicinals appears to occur on an informal level in Zimbabwe. TMPs reported travelling to neighbouring countries, in particular to Malawi, Mozambique and Zambia, to collect "powerful medicinal plants" and animals. Animal species reportedly imported from Mozambique included electric fish, African Elephant and Leopard skins. Plant materials in powdered form used especially for STDs were also reportedly transported unofficially across borders. It was noted that imported medicinal plants were thought to have stronger powers than locally collected specimens (Mukamuri, 1996). The most commonly mentioned imported plant species were: *Alepidea amatymbica*, *Elephantorrhiza goertzii*, *Kana* (unidentified marine species), *Kabereka* (unidentified from Malawi), and *Ensete ventricosa* from Mozambique.

Plant medicines were said to be exported by relatives, friends or TMPs travelling to Botswana and South Africa. There were also anecdotal reports of exports of *Dioscorea sylvatica* tubers to Europe, but no formal trade in wildlife medicinals was documented during this study. Customs and other relevant authorities were not visited during this survey as there was a national strike during the period of field research (Mukamuri, 1996).

Legislation: In Zimbabwe, the practice of traditional medicine is regulated through the *Traditional Medical Practitioners Act, No. 38 of 1981*. This Act effectively legalizes traditional medical practice and sets provisions for the establishment of a Traditional Medical Practitioners Council the purpose of which is to promote traditional medicine and research, to supervise and control TMPs, and to assist with attaining the goals laid out in the Act. One requirement of the Act is that all TMPs register with the government before practising traditional medicine (Chavunduka, 1986).

Also in effect is the *Witchcraft Suppression Act, Cap. 73 of 1899*, which prohibits witchcraft, defined as "the throwing of bones, the use of charms and any other means or devices adopted in the practice of sorcery". This Act is still in effect, and has served to drive witchcraft underground (Chavunduka, 1994).

In Zimbabwe, legislation exists to protect wildlife medicinals used in traditional medicine. This legislation is not, however, well enforced. Some collectors have noted that they are required by the Minister of Local Government to have a licence when collecting outside their local areas, as prescribed under the *Communal Land Produce Act*. Zimbabwe also has legislation protecting certain "Specially Protected Plants" and in particular stipulates that listed plant species are not supposed to be cut, harvested or injured. Species of medicinal value included in the list are: Impala Lily *Adenium multiflorum*, *Cyathea* spp., *Euphorbia* spp., *Gloriosa superba*, *Kniphora* (= *Kniphofia* ?) spp., *Pachypodium saundersii*, and *Warburgia salutaris*.

Conservation: Opinions varied on whether or not it is becoming more difficult to collect plant materials in Zimbabwe (Mukamuri, 1996). TMPs complained of the growing scarcity of medicinal plants, which they attributed to increased numbers of themselves, private land owners' denial of access, and indiscriminate habitat loss. Vendors who bought from collectors seemed unaware of the status of plant species in the wild. Forty-six vendors were questioned as to the general availability of their plant materials. Thirty-three said

Table 18
Medicinal plant species reportedly of conservation concern in Zimbabwe

Species	Life form	Part used	Reason for concern	Notes
Alepidea amatymbica		tuber	reportedly scarce, also imported	
Asclepias glaucophyllus			reported as scarce	
Elephantorrhiza goertzii	geophyte	tuber	reported as scarce, traded in large volumes, also imported	occurs in southern Africa
Elephantorrhiza elephantina	geophyte	tuber	reported as scarce, traded in large volumes	
Rhus lancea	small tree		reported as scarce	distributed from tropical west Africa to Kenya, south to Angola and Mozambique
Rubia cordifolia	tree	-	reported as scarce	occurs from Africa to Asia
Swartzia madagascarensis	tree	root, bark fruit	reported as scarce	distributed from Gambia to Tanzania south to Namibia, Botswana and Mozambique
Warburgia salutaris	tree	root, bark	reported as scarce	reportedly scarce in neighbouring countries

Source: Drummond, 1981; Mavi, 1996; Mukamuri, 1996.

that, overall, plant materials were difficult to get, and 15 reported that they found them to be always available (Mukamuri, 1996). Collectors generally believed that a licence gave them the authority to pick anywhere and in any amount, but stated that all species were becoming harder to find (Mukamuri, 1996). **Table 18** records medicinal plant species identified as conservation priorities in Zimbabwe. It was not possible during this survey to document volumes of animal medicinals traded in Zimbabwe, hence no priority animal species have been identified.

Conclusions: Traditional medicine is the predominant form of health care in Zimbabwe and appears to be gaining in popularity. The number of TMPs practising in the country seems to be on the rise, and many TMPs report an increase in business. The government has made efforts to collaborate with TMPs, a marked change from earlier policy. Collectors of plant wildlife medicinals believed that these were generally becoming harder to find and a number of species are recognized by TMPs, vendors and collectors as being scarce.

The majority of TMPs in Zimbabwe are registered with the Zimbabwe National Traditional Healers' Association, which could be a powerful force in addressing declines of valued medicinal species. Cultivation should be encouraged, as well as sustainable harvesting techniques.

Recommendations

- Encourage propagation of scarce species.
- Encourage TMP associations to support any eventual cultivation efforts.
- Carry out an in-depth survey of animal species traded for medicines.

Namibia

Background: *Area*: 824 293km^2 (IUCN, 1990). ***Population***: Estimated at 1.4 million in 1991, with a three per cent annual growth rate (M. Lindeque, *in litt.* to N. Marshall, 1997). ***Flora***: Plant species are thought to number 3159, but the level of endemism is unknown (IUCN, 1990).

Namibia is the most arid country south of the Sahara, and is characterized by a varied topography including mountains, sand dunes, grassy plains and granite inselbergs (Maggs *et al.*, 1994). Average annual rainfall for the country is recorded at 270mm, although it reaches 700mm in the north-eastern Caprivi Strip. Proclaimed conservation areas cover 13% of Namibia, yet not all vegetation types are represented in the protected areas network. Maggs *et al.*, (1994) report that the low human population density in Namibia is reflected by similarly low pressure on plant resources in certain areas.

Field research for this report (Mander *et al.*, 1996) was carried out in the capital, Windhoek.

Medical context: While Western medicine is available in parts of Namibia, reliance on traditional medicine is high. The demand for wildlife medicinals in Namibia is widespread, and use occurs in both rural and urban areas. In the rural areas, people are relatively knowledgeable about the identity and application of medicinals. Settlements are dispersed and because the population density is low, the situation favours self-medication whereas, in urban areas, TMPs figure more prominently in health care (Mander *et al.*, 1996).

At present, there are about 2400 TMPs registered with the National Eagle Traditional Healers Association (NETHA), the sole healers' association in Namibia; however the actual number practising could be much higher. The TMP to patient ratio differs from one region to another (see **Table 1**). Lumpkin (1994)

estimated that just over half of all TMPs were women. TMPs originating from DRC, Malawi, Tanzania, Zambia, Zimbabwe and west Africa are known to practise in Namibia (Mander *et al.*, 1996). Collaboration exists between NETHA and the Government of Namibia, and is aimed at improving the provision of primary health care and the skills of traditional birth attendants (Omambia, 1996, in Le Beau, 1996).

Trade: Local medicinal markets are few in Namibia as, according to Mander *et al.* (1996), most trade occurs directly between TMPs and collectors. Wildlife medicinals used in Namibia are reported to include local species and a significant quantity of South African products: because of the proximity of South Africa, and the fact that many TMPs receive their training in South Africa, their knowledge base is primarily oriented towards South African products (Mander *et al.*, 1996). Namibian wildlife medicinals are thought to originate primarily in the northern regions of Okavango, Cuvelai and Caprivi, and, if not used locally, are transported to Windhoek (Mander *et al.*, 1996). Estimates of volumes traded were difficult to obtain owing to the absence of markets. In South Africa, TMPs have been observed using about six kilogrammes per month of plant material; if rates of usage in Namibia are similar, the 2400 members of NETHA would thereby use around 173t between them, annually. The number of plants appearing in local trade in Namibia was found to be high, with prices varying considerably depending on the species and plant part offered. For example, data collected from two small retail outlets in Windhoek revealed that one kilogramme of bark from an uncommon Afromontane tree species, *Ocotea bullata*, could cost as much as N$200/kg (USD44/kg), while unidentified local bulbs were priced at N$7/kg (USD1.60/kg) (Mander *et al.*, 1996). Mander *et al.* (1996) recorded a total of 53 plant species reported by TMPs to be in demand for the medicinal trade in Namibia. Most are collected in Namibia, but about 20% are also sourced from South Africa.

Animal medicinals were also found to be used in Namibia (see **Annex 1**), and an increasing demand for such products, which are most often used for their magical properties, has been attributed to increasing urbanization and its corresponding social pressures and stresses (Mander *et al.*, 1996; Cunningham and Zondi, 1991). Medicinal animal species regarded as being in demand are listed in **Table 19**.

The medicinal species which has received the most attention from wildlife authorities in Namibia is the Cape Pangolin. Pangolin scales have been reported to be used by TMPs to treat heart conditions, and the blood and internal organs used as a remedy for psycho-sociological problems. The highest prices - as much as N$10 000 (USD2400) per animal - have been reported for live pangolins (Griffin, pers comm. to M. Mander, 1996; Mostert, pers. comm. to M. Mander, 1996). Morsbach (pers. comm. to M. Mander, 1996), however, reported lower prices based on information from investigations, ranging from N$200 to N$9000 (USD44-USD2000) for a live adult. No trade or seizures of pangolins were recorded in 1996 and 1997, however, and even in 1995 it was surmised by the Protected Resources Unit that pangolin dealers were experiencing difficulties in selling specimens (M. Lindeque, *in litt.* to N. Marshall, 1997). Information from Namibian law enforcement authorities indicates that trade in pangolins earlier in the 1990s may have been based on speculation: only three pangolins were reported in trade prior to 1991, contrasting with about 200 between 1991 and 1995 (Mander *et al.*, 1996). While it was thought that this increase in trade was to meet sudden demand from staff of foreign embassies and illegal traders, minimal evidence exists to substantiate this assumption (Mander *et al.*, 1996). Given the rapid rise and fall in trade in pangolins, it seems plausible to conclude that the trade was based on speculation rather than actual market demand. Nevertheless, there remains a demand by TMPs for pangolin, and anecdotal information indicates that pangolins are imported from Angola, and also exported to Zambia and Zimbabwe (Bräutigam *et al.*, 1994; Griffin, pers. comm. to M. Mander, 1996).

Table 19

Medicinal animal species reported to be in demand in Namibia

Species	Common name	Source	Part used	Distribution
Arctocephalus pusillus	Cape Fur Seal	Namibia	genitalia, head, fat	South Africa, Namibia
Ardeotis kori	Kori Bustard	Namibia	?	east and southern Africa
Dendroaspis polylepis	Black Mamba	Namibia	whole animal	Senegal to Somalia and south to South Africa
Giraffa camelopardalis	Giraffe	Namibia	fat	Africa
Geochelone pardalis	Leopard Tortoise	Namibia	whole animal	east and southern Africa
Manis temminckii	Cape Pangolin	Namibia Angola	scales, internal organs and blood	Africa
Myrmeleontoidea	Ant Lions	Namibia	whole animal	?
Tragelaphus oryx	Cape Eland	Namibia	pericardal fat	Namibia, South Africa, Botswana, Zimbabwe, Mozambique

Source: Mander *et al.*, 1996

International trade: International trade in wildlife medicinals in Namibia appeared to be dominated by the importation of South African products. Approximately 200 South African plant species were available in Windhoek, acquired either through mail order or by arrangements with travellers going to South Africa (Mander *et al.*, 1996). Some healers said they preferred plants of South African origin because they had been trained in their use. It was also reported that expatriate healers in Namibia place orders for plant species occurring in Botswana, Zambia and Zimbabwe (Mwene, pers. comm. to M. Mander, 1996).

The two main exports of wildlife medicinals were reported to be *Harpagophytum* spp. and Cape Fur Seal *Arctocephalus pusillus* (see **Tables 20** and **21**). Both *Harpagophytum procumbens* and *H. zeyheri* are collected from the wild in Namibia and have tubers that are traded in dried or powdered form as a remedy for rheumatism and arthritis. *Harpagophytum* was first exported in significant quantities in 1962 (Nott, 1986). Trade figures are available from 1973, when 28t were exported; by 1995, total exports had reached 234.2t (Nott, 1986; MET data). Recorded importers include Belgium, France, Germany, Japan, South Africa, South Korea, Spain and the UK (Morsbach, pers. comm. to M. Mander, 1996). *Harpagophytum* sp. is reportedly also available in the USA and Canada (N. Chalifour, *in litt.* to N. Marshall, 1996); countries other than Namibia could be the source. At present there are 11 companies exporting *Harpagophytum* and its harvest has become an important source of revenue for local communities. Collectors receive anywhere from N$1.50 to N$8.50 (USD0.33-1.85)/kg, while prices paid by importers vary from USD1.10-3.56. At the retail level in Western markets, *Harpagophytum* can fetch as much as USD180/kg (F. Dennis, pers. comm. to N. Marshall, 1997). On the global market, it is increasing in popularity, and it can be assumed that the trade will grow in volume (F. Dennis, pers. comm. to N. Marshall, 1997).

Table 20

***Harpagophytum* exports from Namibia, 1973-1996**

Year	Quantity (kg)	Value (USD)	Reference
1973	28 161		De Bruine and Clark, 1976; De Bruine *et al.*, 1977 (in Nott, 1986)
1976	180 000		De Bruine and Clark, 1976; De Bruine *et al.*, 1977 (in Nott, 1986)
1977	190 000		De Bruine and Clark, 1976; De Bruine *et al.*, 1977 (in Nott, 1986)
1981	84 350		Nott, 1986
1982	133 619		Nott, 1986
1983	124 291		Nott, 1986
1984	107 800		Nott, 1986
1985	183 370		Nott, 1986
1986, Jan-Apr	91 078		Nott, 1986
1994	149 688	US$164 656	Permit data from the Ministry of Environment and Tourism
1995	234 209	US$257 629	Permit data from the Ministry of Environment and Tourism
1996	327 652		Permit data from the Ministry of Environment and Tourism

Source: Nott, 1986; Ministry of Environment and Tourism permit data.

Table 21

Reported exports of Cape Fur Seal from South Africa and Namibia

Year	Part exported	Exporter	Importer	Exports reported	Imports reported	Reporting unit
1980	bones	South Africa	Hong Kong	45		kg
1983	pieces	South Africa	Hong Kong	100		kg
1986	specimens	South Africa	Hong Kong	530		kg
1986	specimens	South Africa	Hong Kong	2		none
1986	specimens	South Africa	Japan	1		kg
1986	specimens	South Africa	Taiwan	112		kg
1987	bones	South Africa	Hong Kong	133		kg
1988	bones	South Africa	Hong Kong	778		kg
1989	bones	South Africa	Hong Kong	237		kg
1993	genitalia	Namibia	Hong Kong		161	kg
1993	genitalia	Namibia	Hong Kong	220		none
1993	genitalia	Namibia	South Africa	2		none
1994	genitalia	Namibia	Hong Kong		322	kg
1994	genitalia	Namibia	Hong Kong	1600		none
1995	genitalia	Namibia	Korea	5		kg
1996	genitalia	Namibia	China	10		kg
1996	genitalia	Namibia	South Africa	327		kg
1996	genitalia	Namibia	Hong Kong	50		kg
Total				**2328kg? 1822?**	**483kg**	

Source: CITES Annual Report data.

Cape Fur Seal is the only significant legal export of an animal species for medicinal purposes. This species has been listed in CITES Appendix II since 1977 and, as such, trade data are available. Cape Fur Seals are traded as live animals, skins, garments, and the male genitalia are exported to Asian markets for use in East Asian traditional medicine. The testes and penis of seals are used to treat the liver and kidney, impotence and decreased sexual drive, and to treat cold limbs and aversion to cold (Gaski and Johnson, 1994). It is not known if there is preference for particular species, although those reportedly appearing most frequently in Asian markets are the Northern Fur Seal *Callorhinus ursinus* and the Harbour or Spotted Seal *Phoca vitulina.*

Trade has been reported from South Africa in Cape Fur Seal genitalia since 1980, with Namibia entering the trade in 1993 (**Table 21**). Importers include Hong Kong, Taiwan, China, Korea and Japan. As noted below, reporting by importers has been sporadic. Nevertheless, it appears that the Cape Fur Seal is primarily traded for its skin, and that seal genitalia are a by-product of this larger trade. The bull seal harvest has been reported to be in the region of 3-4000 animals per year at the Cape Cross Colony (UCT, 1996). With such a harvest, the production potential for the medicinal market is high, and it can be surmised that the medicinal trade is not cause for concern.

Legislation: Namibia has various laws that relate to the control of trade in wildlife. Several pre-date independence from South Africa in 1991. The *Nature Conservation Ordinance No. 4 of 1975*, which includes all animals and a list of protected plant species, provides for the control of collection, possession, transport, domestic trade and import/export of animals and protected plants. The *Forestry Act No. 72 of 1968* and the *Forestry Ordinance No. 37 of 1952* provide for the control and marketing of commercial timber species in Namibia. Also relevant is *Proclamation AG42 of 1980* regarding trade in parts of elephants and rhinoceroses, and the *Sea Fisheries Act (1996),* which regulates trade in marine species.

In addition, Namibia has provided specific protection status to *Harpagophytum* by including the genus in Schedule 9 of the *Nature Conservation Ordinance of 1975*, and since 1975 permits have been required for the collection, transport, possession or sale of *Harpagophytum.* This permit system was, however, discontinued after 1987, following a survey of harvest and export during which the system was determined to be ineffective (Nott, 1986). After 1987, permit requirements were restricted to commercial traders of *Harpagophytum* and companies or individuals trading for commercial purposes were required to register with the Ministry of Environment and Tourism, to obtain permits for each shipment exported, and to submit on a monthly basis data on quantities harvested and locality of harvest (Mander *et al.*, 1996).

Namibia is a Party to CITES.

Conservation: TMPs in Namibia reported that they had to travel greater distances to acquire the medicinal plants needed for their healing practices. This may in part be owing to the seasonal availability of some plant species, but it may be owing to habitat loss through conversion to agriculture (NETHA, pers. comm. to M. Mander, 1996). Plant species regarded by TMPs as becoming more difficult to obtain in Namibia included *Albizia brevifolia*, *Colophospermum mopane*, *Commiphora mollis*, *Commiphora glaucescens*, *Commiphora pyracanthoides*, *Elephantorrhiza elephantina*, *Fockea angustifolia*, *Gardenia spatulifolia*, *Momordica balsamina* and *Protea gaguedi* (Mander *et al.*, 1996). Some of these species are plentiful in Namibia and some are widely distributed in the region, hence reports of scarcity cannot be attributed to declining populations. Species that are regarded as stable include *Colophospermum mopane*, *Commiphora pyracanthoides* and *Elephantorrhiza elephantina* (M. Lindeque *in litt.* to N. Marshall, 1997). *Albizia brevifolia,* a small tree occurring on stony hillsides, does have a very limited distribution in north-west Namibia (Palgrave, 1977); its reported scarcity may merit further investigation. *Protea gaguedi* may be

extinct in Namibia, but it is not threatened in other parts of southern Africa (Hilton-Taylor, 1996), and it has a wide distribution extending to north-eastern Africa.

Exports of *Harpagophytum* were regarded in 1986 as sustainable (Nott, 1986), but no survey has been carried out since that time. Given that global commercial interest in *Harpagophytum* is growing, and the number of individuals and companies in Namibia involved in the trade is on the rise (Kubirske, pers. comm., to M. Mander, 1996), this trade should also be regarded as a cause for concern and a priority area for future research.

Of the animal species reported to be in high demand by TMPs in Namibia (**Table 19**), the Cape Fur Seal is not likely to be adversely affected by the export of genitalia from Namibia for medicinal purposes, since harvest is mostly carried out for other purposes, such as for pet food and skins, and is generally regarded as sustainable. The Cape Pangolin, however, which occurs in low population densities, is reported to be increasingly difficult to obtain, as are the Leopard Tortoise and African Rock Python.

Conclusion: TMPs report difficulties in obtaining supplies of some plant and animal medicinals, but some of the plant species involved are in fact quite abundant in Namibia. Trade in *Harpagophytum* is of particular interest and importance, as it is a valuable export and effective management will allow a continued supply.

Recommendations

- Conduct research to increase the understanding of medicinal markets and trade patterns, supply and demand.
- Carry out a survey of the status of *Harpagophytum* spp.
- Review imports of wildlife medicinals from South Africa
- Investigate the trade in Cape Pangolin, African Rock Python, and Leopard Tortoise.

Lesotho

Background: ***Area***: 30 344km^2. ***Population***: 2 000 000. ***Flora***: Estimated number of vascular plant species was 1591 in 1986, but the flora is insufficiently known and hence this figure is likely to be inaccurate (Davis *et al.*, 1986; Scott *et al.*, 1996). The number of endemics is similarly unclear, yet it has been estimated that the percentage may be about 30% (Schmitz, 1982). Cultivation has led to the introduction of numerous exotic species, and over-grazing has favoured grasses able to withstand grazing pressure (Talukdar, 1994). In 1995, 52 plant species were regarded as threatened (Hilton-Taylor, 1996).

Within Lesotho, two altitudinal zones are recognized: the lowlands which are situated along the western border, occur below 2000m and are characterized by sandstone-derived soils primarily under cultivation; and the highlands which make up 75% of the country, occur at above 2000m, and are a montane zone underlain by basalts of the Karroo Sequence. The highland zone harbours rugged mountain slopes and deeply incised river valleys, and until recently was largely inaccessible except by foot or on horseback (Scott *et al.*, 1996).

Fifteen per cent of the population live in the lowland urban areas, and the remainder in villages. While rural inhabitants practise subsistence agriculture and maintain livestock, the economy of Lesotho is strongly linked with that of South Africa, and about six to seven per cent of the Basotho people of Lesotho work in the gold mines of Gauteng and Free State Province (Scott *et al.*, 1996).

Research carried out for this study (Scott *et al.*, 1996) focused exclusively on the herb market in the capital, Maseru, where vendors were interviewed.

Medical context: While the government health service in Lesotho is based on Western medical principles, a significant portion of the population relies on traditional medicine to meet its health care requirements (Scott *et al.*, 1996). This is largely because of the high cost of, and inadequate access to, Western medicine in the rural areas. In 1991, there were reportedly 8579 licensed TMPs in Lesotho, although the total number of TMPs is unknown (Scott *et al.*, 1996).

Prior to Lesotho's independence, traditional medicine was discouraged and legislated against. Following independence, *Act No. 19 of 1978* allowed the establishment of the Lesotho Universal Medicinemen and Herbalists Council. Members are appointed by the Minister of Health, and the institution functions as both Council, which has a voice in government policy discussions, and as a professional association. This association currently includes 23% of all licensed TMPs as members. No other healers' associations are allowed to operate legally, so while the remaining TMPs may practise, they have no voice in medical politics (Scott *et al.*, 1996).

Trade: Medicinal plants figure prominently in the traditional medicine of Lesotho, and all categories of TMPs use herbs. Species reportedly in high demand are listed in **Table 22**. Favoured plant parts include subterranean organs such as corms, bulbs and tubers; all plant species are reportedly collected from the wild. Demand is from TMPs, and also from vendors and collectors, who gather for sale to the general public, for self-medication (Scott *et al.*, 1996). Plants are generally collected from the highlands of Lesotho, and according to one vendor in the Maseru market, stocks are replenished twice per week. Most species are reported to be plentiful, with the exception of *Alepidea amatymbica*, *Aloe polyphylla* and *Dicoma anomala*.

***International trade*:** The volumes of medicinal materials imported into or exported from Lesotho are unknown, but may be significant and certainly warrant future research attention. Some vendors in the

Table 22
Medicinal plant species reported to be in high demand in Maseru market, Lesotho

Scientific name	Common name	Part used	Use
Alepidea amatymbica	lesoko	root	colds, stomach ailments
Aloe polyphylla	lekhala	whole plant	
Boophane disticha	leshoma	underground parts	
Bulbine narcissifolia	khomo-ea-balisna	underground parts	
Dicoma anomala	hloenya	underground parts	diarrhoea, colic, colds
Eucomis autumnalis	khapumpu	underground parts	
Euphorbia clavarioides	sehloko	whole plant	
Gunnera perpensa	qobo	underground parts, leaf	kidney problems
Helichrysum caespititium	phate-ea-ngaka	aboveground parts	
Hypoxis spp.	Ilabatheka	underground parts	
Ledebouria cooperi	lepjetlane	underground parts	
Pelargonium reniforme	khoara	underground parts	
Tulbaghia alliacea	sefotha-fotha	underground parts	
Xysmalobium undulatum	pho-sehla	underground parts	

Source: Jonathan, 1992; Scott *et al.*, 1996.

Maseru herb market reported supplying 50kg sacks of *Alepidea* regularly to the markets in Durban and Johannesburg. Another reported travelling to Cape Town and other South African medicinal markets to purchase herbs for resale in Maseru (Scott *et al.*, 1996).

Legislation: Legislation in Lesotho related to fauna and flora is primarily contained in the *Historical Monuments, Relics, Fauna and Flora Act, 1967 (No. 41 of 1967)*, which regulates harvest, destruction, and trade of designated wildlife species. Such species have been designated through the *Proclamation of Monuments, Relics, Fauna and Flora (Legal Notice No. 36 of 1969)*. Additional legislation prohibits the sale or export of plumage from wild birds (The *Wild Birds Proclamation No. 43 of 1914)*, and the sale or export of meat, hides or skins of specified game species (*Sale of Game Proclamation No. 5 of 1939*). *Proclamation No. 57 of 1952,* as amended, states conditions and permit requirements for the importation or export of a variety of animals (IUCN, 1986). According to Scott *et al.* (1996), regulations pertaining to the exploitation of flora are not rigorously enforced, and as a result some medicinal plant species are under threat from uncontrolled collection. Lesotho has signed, but not ratified CITES, and is therefore not yet a Party.

Conservation: Plant species identified as being of conservation concern are listed in **Table 23**. *Aloe polyphylla* is also under considerable pressure from collection for the horticultural market. Known as the Spiral Aloe, this plant is uprooted for sale despite its protected status (Talukdar, 1994). Other threats to medicinal plants in general, besides over-collection, include loss of habitat and improved accessibility of previously remote areas, through road construction. For example, depletion of populations of medicinal species has been observed following the construction of the Maseru-Katse highway.

Table 23
Medicinal plants reported to be of conservation concern in Lesotho

Species	Life form	Part used	Reason for concern	Notes
Alepidea amatymbica		root		
Aloe polyphylla	succulent	whole plant	reported as Endangered on global level	overexploited for horticultural trade
Dicoma anomala	perennial herb	underground parts		
Eucomis autumnalis ssp. *clavata*		underground parts	reported as Vulnerable in Lesotho	
Gunnera perpensa		underground parts, leaf		
Scilla natalensis	geophyte		reported as Vulnerable in Lesotho	

Source: Hilton-Taylor, 1996; Scott *et al.*, 1996.

Conclusion: In Lesotho, traditional medicine holds an important place in the health care of the country's inhabitants. Use of wildlife medicinals, in particular plants, is thought to be significant, although little is known about the quantities traded. Medicinal plants are reported to be both imported into and exported from Lesotho. In recent years, remote areas of the country have become more accessible and as a result pressure on some medicinal species is increasing. While many species remain common and widely available, during this survey six plant species were identified as requiring attention because of possible over-exploitation for medicinal use.

Recommendations

- Carry out medicinal market surveys nationwide and in particular in Butha Buthe, Leribe, Berea, Mafeteng, Mohale's Hoek, Quthing, Qach's Nek, Mokhotlong and Thaba Tseka, identified as worthy of future surveys of medicinal markets.
- Conduct trade surveys for species reported to be of conservation concern (*Aloe polyphylla*, *Alepidea amatymbica*, *Eucomis autumnalis* ssp. *clavata*, *Scilla natalensis*, *Gunnera perpensa* and *Dicoma anomala*).
- Undertake a review of animal species used for medicines in Lesotho.
- Investigate international trade, especially to South Africa.

Swaziland

Background: *Area*: 17 000km^2. *Population*: Estimated at 763 000 (IUCN, 1990). *Flora*: An estimated 2400 indigenous plant species, and 157 naturalized exotics (Braun and Dlamini, 1994). The vegetation of Swaziland is diverse, and includes grasslands, forest, semi-arid savanna and wetlands.

The country has a variable climate and diverse soils and geology, and rainfall ranging between 500 and 1500mm per year. The altitude is variable and extends from 120m to over 1860m.

Van Damme (1996) interviewed TMPs during field research for this report.

Medical context: Swaziland is closely tied to South Africa on a number of levels, and health is no exception. Swaziland imports a large percentage of its drugs from South Africa, and South African doctors frequently practise in Swaziland. Moreover, Swaziland's medical insurance system is part of a larger South African system (Gort, 1989).

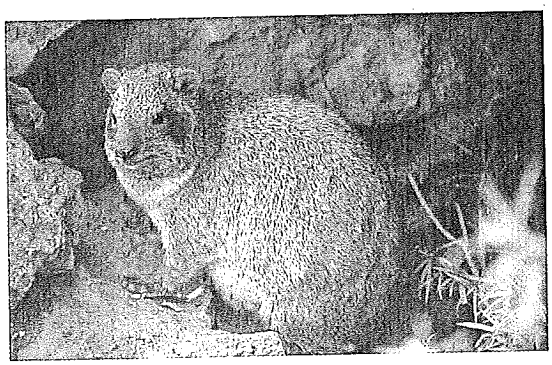
Efforts have been made to encourage collaboration and co-operation between TMPs and the Western medical community, in particular by working through the Swaziland Traditional Healers' Society which represents the majority of TMPs in Swaziland, and has an extensive and effective network of regional committees. Efforts have focused on collaboration between nurses and TMPs to prevent and control eight diseases afflicting children. Attention was given to encouraging better hygiene, and especially to treating diarrhoea in children under five (Hoff and Maseko, 1986). These projects are not, however, regarded favourably by all parties, and Gort (1989) has noted that some factions within the Western medical community resent the involvement of TMPs in the national health care system, believing that their inclusion keeps the country in a backward state.

In the last two decades, the number of Swazi workers in South Africa has decreased continually, resulting in an increase in unemployment in Swaziland. One field of employment that is of increasing interest in Swaziland is healing, and hence the economic situation has contributed to an increase in TMPs (Gort, 1989).

It is estimated that there are between 5000 and 8000 TMPs in the country, half of whom are women (Green, 1985), resulting in a TMP to patient ratio of 1:100 (Hoff and Maseko, 1986). In 1985 the doctor to patient ratio was estimated at 1:10 000 (Green, 1985). TMPs in Swaziland can be classed in four categories, those of herbalist, midwife, spirit medium and faith healer (Hoff and Maseko, 1986), but Gort (1989) observes that these traditional categories are changing as TMPs develop new roles in response to external influences and changing local perceptions.

Green (1994) notes that TMPs started in the late 1980s to administer ampicillin and tetracycline, and that there is high physical resistance to these antibiotics in Swaziland. Use of antibiotics is confirmed by Van Damme (1996).

Trade: Little is known about the patterns of local medicinal trade in Swaziland, but vendors are active in the informal market. Van Damme (1996) reports that certain aspects of traditional medical practice are still illegal in Swaziland, and as such hawkers cannot get licences to sell medicines. Health inspectors actively check street vendors and market areas for vendors of traditional medicine, and this has caused the trade and the practice of traditional medicine in general to be somewhat covert (Van Damme, 1996).



Credit: WWF/Mauri Rautkari

Rock Hyrax *Procavia capensis*

During this survey, 12 plant species and ten animal species were identified as being in high demand in Swaziland. Unfortunately, all plant medicines were identified in the vernacular, and further research is required to establish their precise identity (see **Table 24**). This is also the case with some of the animals identified, for which there may be more than one species corresponding to the common name. Animals reported to be in high demand for the medicinal trade included: Nile Crocodile, Leopard, duiker *Cephalophus* spp., warthog, baboon, African Rock Python, Jackal *Canis* sp., Rock Hyrax *Procavia capensis*, Wildebeest, and Kudu *Tragelaphus* sp.(Van Damme, 1996).

Table 24

Medicinal plant species reported to be in high demand in Swaziland

Common name	Use
imfa ngenhlanye	for labour pains
sifulayi	drawn on the skin without incision
mpinda mshaye	to destroy a bad spell
sicisha mlilo	used for pregnancy ailments
lithabi likacici	to purify by vomiting
sihlati lesilumanako	administered to children with swelling stomachs
inhloni	helps to fight enemies
imboziso	administered in food poisoning cases when one has sores
madlozi	given for fertility
sipoliyane	given for migraine sufferers
umuthi wamathambo	for painful backs
lidlunjana	for backache

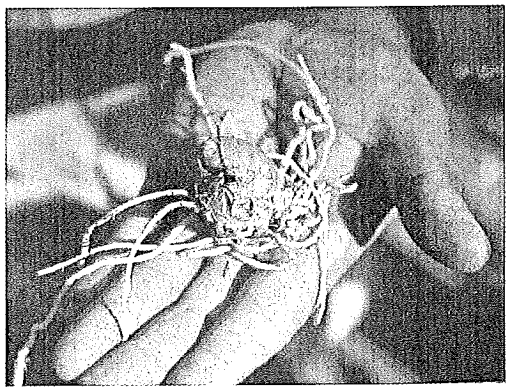
Source: Van Damme, 1996.

International trade: International trade volumes for wildlife medicinals into, and out of, Swaziland are unknown, but Swaziland has the reputation of having powerful traditional healers and potent medicines. Foreign demand for Swazi medicine has been observed as being high, in part because of international publicity about African traditional medicine (Van Damme, 1996).

Van Damme (1996) notes that Swazi vendors of handicrafts are present in all major trading sites in South Africa, and it is therefore likely that Swazi medicines are also present in South Africa. The trade in animal medicinals is however less likely, given current legislation in Swaziland restricting hunting and trade.

Legislation: The first law pertaining to traditional medicine was passed in 1894, and prohibited the practice of "witchdoctoring" (Green and Makhubu, 1984). This law is still in effect today. TMPs have been required to be registered since the late colonial period, and a 1983 survey revealed that some 82% of the TMPs were registered; registration does not require that TMPs state what type of healer they are. TMPs are required to pay taxes, but TMPs in general approve of the registration system as it gives them respectability, allows them to practise throughout Swaziland, and implies that the government would assist them in collecting overdue fees from patients (Green and Makhubu, 1984). Application of the witchcraft act of 1894 is selective, with enforcement agents occupied primarily with apprehending witches, but also with halting use of restricted animal (including human) parts (Van Damme, 1996).

Conservation: While certain species were identified as being in demand, no TMPs identified any species as being scarce (Van Damme, 1996) and therefore it is likely that current demand does not exceed availability. Nevertheless, with the increase in the number of TMPs and likelihood of increased foreign demand from neighbouring South Africa, it is likely that this situation will not remain static. Indeed, Cunningham (1993b) reports the growing scarcity in Swaziland of *Warburgia salutaris*, used for colds and coughs, headaches and stomach ailments, *Alepidea amatymbica* for treatments of coughs and colds, and *Siphonochilus aethiopicus*, also for coughs and colds and protection against lightning.



Credit: V.L. Williams, Department of Botany, University of the Witwatersrand

Wild ginger *Siphonochilus aethiopicus*, one of the scarcest plant species used in traditional medicine in the region.

Conclusion: In Swaziland, traditional medicine is the dominant system of health care in the country, despite legislation prohibiting certain aspects of its practice. Collaboration between TMPs, in particular those of the Swaziland Traditional Healers' Society, and Western medical doctors is increasing. Information about trade routes and volumes of wildlife medicinals traded remains scant, and although TMPs did not report scarcity of medicinal resources to Van Damme (1996) as a significant concern, some species used are regarded as declining, and merit investigation to ascertain actual levels of threat.

Recommendations

- Investigate trade in *Warburgia salutaris*, *Siphonochilus aethiopicus* and *Alepidea amatymbica*.
- Ascertain the identity of the commonly traded animal and plant species and review the impact of trade for medicinal purposes.

South Africa

Background: *Area*: 1 184 827km^2. *Population*: Estimated at over 38 million. *Flora*: About 20 300 plant species. In the south-western Cape Province alone, there are an estimated 8579 vascular plant species, of which 68% are endemic (IUCN, 1990). The country is characterized by exceptional biological diversity, and South Africa is regarded as having the highest concentration of threatened plants in the world (Cowling and Hilton-Taylor, 1994). Plant species, and in particular medicinal plants, have come under threat because of agricultural expansion, afforestation and land development (Cunningham, 1990).

Research for this report was carried out in KwaZulu-Natal (Mander, 1997a) and Mpumalanga (Mander, 1997b).

Medical context: Both Western and traditional medicine are used in South Africa (Mander, 1997a). In KwaZulu-Natal, one-third of health care services are based on indigenous medicine. In terms of the numbers of users, it is estimated that there are over 27 million traditional medicine consumers in South Africa , i.e., the majority of the population (Mander, 1997a). The demand for traditional medicine appears to be driven by cultural background, with little influence from education and income levels. Traditional medicine appears to be a basic requirement for the treatment of particular conditions for most South Africans: Western medicine is in many cases not an alternative to traditional medicine, even when cheaper (Mander, 1997a). A growing demand for traditional medicine in South Africa is attributed to increased urbanization and rising unemployment. Such conditions are stressful both physically, being often crowded and unhygienic, and psychologically, as people are distanced from family support (Cunningham, 1993a; Cunningham, 1993b).

Credit: A.B. Cunningham

A Zulu diviner *isangoma* collecting medicinal tubers in montane grassland in KwaZulu Natal, South Africa.

There have been estimates of between 100 000 to 300 000 TMPs in South Africa. However, as many of these TMPs operate on a part-time basis, the functional number is likely to be much lower. Based on research carried out in KwaZulu-Natal (Mander, 1997a) and Mpumalanga (Mander, 1997b), it is estimated that there are between 34 000 and 44 000 full-time TMPs in South Africa.

The traditional health care system currently receives little or no support from the State, and is largely organized within large numbers of healers' associations, who function at a range of levels, from small localized associations, to large international associations. For example, the Traditional Healers Organisation reports that it has over 80 000 members throughout South Africa, Lesotho and Swaziland (Mander, 1997a). Williams (1997) has estimated that there are at least 100 small associations operating between the Witswatersrand and Natal.

Trade: The wildlife medicinals trade in South Africa involves TMPs, shop traders, street vendors, mail order vendors, collectors and pharmaceutical companies, although much of the trade takes place through a network of individuals trading small volumes with other individuals in an informal manner. It is expected

that as prices increase and as local knowledge becomes more widely accessible, that there will be an increase in market participation by more sophisticated elements of the market such as local and international pharmaceutical companies (Mander, 1997a). Already, there has been a shift from the medicinals trade being the domain of traditional specialists, to a trade including commercial collectors. These collectors, primarily women, play a significant role in supplying urban demand (Cunningham, 1993a).

Medicinal markets exist in urban areas, but there are also significant numbers of TMPs who administer to patients from their homes. Williams (1996) estimated that in Soweto there are about 12 000 traditional medical practitioners, and a surprising absence of traders, as a result of the large number of home-based healers. In the Witwatersrand region there are approximately 200 licensed traders of medicinals, and at least 150 hawkers who sell on the streets. While some TMPs collect the materials they sell, the majority obtain their supplies from traders or wholesalers and some travel to Durban to purchase from markets (Williams, 1996). Mander *et al.*, (1997) report that medicinal material is usually procured by collectors, who sell direct to consumers, or to street traders, shops and TMPs. At the same time, large volumes are traded at the industry level (Mander, 1997a). Some 4300t of wildlife medicinals were estimated to be traded in KwaZulu-Natal in 1996, and up to 750t in Mpumalanga in 1997 (Mander, 1997a; Mander, 1997b). The trade in raw materials in KwaZulu-Natal is estimated to be worth USD13.3 million per year, approximately one-third of the value of the maize harvest in the province. In the whole of South Africa, some 20 000t of raw materials may be traded per year with a value of USD60 million. The value of this volume as a dispensed product is estimated to be USD430 million per year (Mander, 1997a).

A number of studies have been carried out in recent years documenting the trade in wildlife medicinals in South Africa, and have focused on both plants and animals (Cunningham 1993a; Cunningham, 1993b; Cunningham 1988; Cunningham and Zondi, 1991). Cunningham (1993a) noted that plant species valued medicinally in the past, such as *Alepidea amatymbica*, *Cassine transvaalensis*, *Erythophleum lasianthum* and *Warburgia salutaris,* remain popular today. Many TMPs are experiencing shortages of popular plants with numerous reports of business activities being constrained by the lack of access to important plants (Mander, 1997a; Mander, 1997b). The declining access to popular plants has led to an extension and intensification of the gathering network at regional and international levels. A comparison between the location of plants harvested for trade in KwaZulu-Natal in 1988 and in 1996, indicates that for the popular plants there has been an average increase in travel time by 45%, with several plant species being harvested exclusively in neighbouring countries (Mander, 1997a). Sources of plants traded on the Witswatersrand have been documented by Williams (1997), who noted that 42% come from KwaZulu-Natal, 15% from Gauteng, 7% from Northern Province, 6% from Swaziland, 3% from Mpumalanga, with lesser percentages originating from other sources including Lesotho (0.8%), Botswana (0.3%) and Mozambique (0.02%). The remainder of the plants were of unknown origin.

During survey work for this report, approximately 750 plant species were documented as being in use in traditional medicine in South Africa, about 200 of these being used infrequently and probably not traded at all. The prices for indigenous plant products varied considerably, and were largely dependent on the availability and popularity of the plants. Commonly available plants, such as *Scilla natalensis,* may sell for as little as USD0.43/kg, while locally scarce plants such as *Siphonochilus aethiopicus* and *Salacia krausii* may sell for up to USD100/kg and USD550/kg, respectively (Mander, 1997a).

Cunningham (1993a) found that while a large number of plant species is used in South Africa, animal species are used in lower numbers, and are almost exclusively employed for magical or symbolic purposes. For example, the ability of vultures to locate carcasses rapidly and their superb eyesight have resulted in their being used for predicting the future (Cunningham, 1993a).

Cunningham (1993a) documented the use of animal species in KwaZulu-Natal, and found that the most popular species were (in order of popularity): African Rock Python, Nile Crocodile, Hippopotamus, Black Mamba *Dendroaspis polylepsis*, African Elephant, baboon, Lion, Striped Weasel *Poecilogale albinucha*, Eland and monkey. Animal fats are sold, although many of these contain fake ingredients. Volumes of fats sold by the largest commercial wholesaler in Natal, in 1987, reportedly contained Hippopotamus, 109 litres/year; Lion, 42 litres/year; Nile Crocodile, 38.7 litres/year; African Rock Python, 37.7 litres/year; Striped Weasel, 30 litres/year; seal, 29 litres/year; Monitor Lizard, 27.8 litres/year; and Black Mamba, ten litres/year. The medicine *Nyamazane*, which appears to be composed primarily of fish meal, is sold in higher volumes (12.6t/year), as is *Vimbela* (23.3t/year), supposedly a mixture made of mythical beasts. Despite the fact that most of the fats sold do not contain the ingredients claimed, consumers believe they are purchasing a genuine product (Cunningham, 1993a). In urban areas, the proportion of fake animal fats is much higher than in rural areas, where wildlife ingredients may be more easily obtained (Cunningham, 1993a).

***International trade*:** South Africa not only exports processed wildlife medicinals to neighbouring countries in the region, but it is also a significant importer. South African products are available in Namibia, Botswana, Mozambique, Zimbabwe and Malawi (see country reports), and are either offered in markets, shops, or by mail order. These products are most often packaged manufactured products, such as fat sold in bottles. Neighbouring countries serve as sources of raw material for South Africa: in the past, medicinal material used in Witwatersrand was harvested in Natal, the former Transvaal and Swaziland, but supplies are now increasingly coming from Mozambique, Botswana, Zimbabwe, Lesotho, Swaziland and other parts of South Africa, with a corresponding decrease in the quantities harvested in Natal (Williams, 1996).

Popular species which are becoming increasingly difficult to obtain in South Africa are the main focus of international trade. *Alepidea amatymbica, Acridocarpus natalitius*, *Acacia xanthophloea*, *Turraea floribunda*, *Cephalaria humilis*, *Terminalia sericea*, *Haworthia limifolia*, *Boweia volubilis*, *Eucomis autumnalis* and *Warburgia salutaris* are imported in large quantities from Swaziland and Mozambique. These two countries are the main sources of supply for many species (Mander, 1997a; Mander, 1997b). The quantities of imported medicinals are unknown. Much of the 17t of *Warburgia* traded in Durban (Mander, 1997a), and the 10-20t in Gauteng in 1995 (V. Williams pers. comm. to M. Mander, 1997) were probably imported material, since the species is locally extinct in parts of South Africa (Mander, 1997a). Cunningham (1993) observed that *Synaptolepis kirkii* roots were traded from the South Africa/Mozambique border to Lesotho, and that South Africa has a busy mail order industry exporting to neighbouring countries. Owing to scarcity of some species, there is also an influx of imported Asian species which arrive from India *via* Durban (Williams, 1997).

Of note is the export of *Aloe ferox*, which is harvested for the extraction of bitters sap and aloe gels. Approximately 95% of the harvest is derived from wild populations. Total legal harvest is in the area of 400t per year, with an additional 300t presumed to go undocumented. This figure corresponds with an annual harvest of approximately 17 million plants, but as only the leaves are harvested, the plant generally continues to grow. Exports are destined for Europe, Asia and North America, with the main importing countries being USA and Germany. This industry is supported by an organized harvest system which is regarded as being a good example of sustainable use of an important natural resource (Newton and Vaughan, 1996).

Legislation: South Africa is in the process of developing new legislation, but until such legislation is in place, the country relies on existing laws. South Africa is a Party to CITES: a comprehensive discussion of South Africa's wildlife legislation is presented in Bodasing and Mulliken (1996). Exploitation of plants has, in theory, been regulated through legislation such as the *Forest Act No. 122 of 1984*, and the *KwaZulu Forest*

Act No. 15 of 1980, but these regulations have not been effective in halting forest degradation (Cunningham, 1993a). Legislation relating to trade is also present in the form of local-level by-laws, *The Business Act*, and tribal regulations, which influence when and where medicinal products may be sold. These regulations and the degree to which they are applied vary between areas. Furthermore, recent changes in government have promoted informal trading and along with it, the trade in indigenous plants (Mander, 1997a).

At the provincial level there are also nature conservation ordinances which place strict limits on trade in plants and animals. Species are classified as "protected", "specially protected", or "controlled" (all indigenous species except "protected" and "specially protected"). Trade in "protected" or "specially protected" species is prohibited without a permit. In KwaZulu-Natal, eight of the ten species seen most often in trade are banned from harvest or purchase without authorisation permits, and 23 of the 70 most-traded medicinal products purported to contain either "protected" or "specially protected" species (Mander, 1997a).

Legislation affecting the practice of traditional medicine has been in place since the 1890s (Dauskardt, 1994). Traditional medicine was regarded as a threat to Western medical professionals (economically and socially), and efforts were made to curtail its presence by requiring licences and prohibiting certain forms of traditional medical practice. Laws such as the *Natal Code of Native Law No. 19 of 1891* required that herbalists had approval from the regional African chief in order to practise, and that they purchase a licence (Dauskardt, 1994). The enactment of the *Medical, Dental and Pharmacy Act No. 13 of 1928* served to constrain TMPs further by restricting licence issuance to the Minister of Public Health, with the aim of reducing the number of practising TMPs and traditional medical practice in general (Dauskardt, 1994). At the same time, the government was reluctant to ban traditional medicine, knowing that this would leave the majority of the population with no health care at all. Prohibited activities were specified in a number of laws, such as the *Witchcraft Suppression Act No. 3 of 1957,* which is still in effect (Dauskardt, 1994). In KwaZulu-Natal, registration of herbalists and midwives is covered by the code of *Zulu Law (Act 6 of 1981)* (Cunningham, 1993a).

At present, there exists a Medicines Control Council (MCC), which plays an important role in the regulation of any medicines produced and traded (Mander, 1997a). Any product which is sold with either a stated or implicit medical purpose, has to satisfy the MCC's standards regarding safety, efficacy and quality. The costs of testing products to meet the MCC's required standards are likely to prohibit all but the largest drug companies from marketing products legally. The MCC is therefore a major limitation in promoting low cost production and marketing of medicinal plants (Mander, 1997a).

Conservation: **Table 25** presents the plant species that are destructively harvested, and have been reported to Mander *et al.* (1997) to be scarce, traded in large volumes, traded widely, and to have a high market value. There is significant overlap with species identified as becoming scarce by urban herb traders, rural herbalists, and members of the Natal Herb and Traditional African Medicines Traders Association (HTA) (Cunningham, 1993a) (see **Table 26**).

The top three species nominated by HTA members were *Warburgia salutaris*, *Bowiea volubilis*, and *Siphonochilus aethiopicus*. The top three identified by urban herb traders were *Ocotea bullata*, *Warburgia salutaris* and *Eucomis* sp., and by rural herbalists *Ocotea bullata*, *Warburgia salutaris* and *Bowiea volubilis*. One of the main reasons for scarcity was recorded as commercial over-exploitation to meet urban demand (Cunningham, 1993a). Further study by Cunningham (1993a) involved damage assessments of five valued medicinal tree species (*Cassine papillosa, Cassipourea gerrardii, Curtisia dentata, Ocotea bullata* and *Warburgia salutaris*) in forests in Transkei and Natal/KwaZulu, where commercial harvesting was taking place. Study results revealed that commercial harvesting had a significant impact on reducing the number

Table 25

Medicinal plant species reported as scarce, heavily traded or with a high price in South Africa

Species	Life form	Part used	SC	LV	TW	HV
Alepidea amatymbica		root	x	x	x	x
Aloe aristata	succulent	whole plant				x
Ansellia africana		whole plant			x	x
Artemisia afra	herb	whole plant, leaf		x		
Boophone disticha	geophyte	bulb		x	x	x
Boweia volubilis	geophyte	bulb	x	x	x	x
Bulbine spp.	herb	whole plant, root			x	
Cassipourea gerardii	shrub or small tree	bark		x	x	
Clivia miniata		whole plant	x	x	x	
Curtisia dentata	tree	bark			x	x
Dioscorea dregeana		whole plant, tuber		x		x
Dioscorea sylvatica		tuber			x	x
Drimia elata	geophyte	bulb		x		
Eucomis autumnalis		bulb	x	x	x	x
Gunnera perpensa				x	x	
Haworthia limifolia		whole plant	x			x
Ocotea bullata	tree	bark, root	x	x	x	x
Rapanea (=Myrsine) melanophloeos	tree	bark, root			x	
Scabiosa columbaria	herb	whole plant, root				x
Scilla natalensis	geophyte	bulb		x	x	
Siphonochilus aethiopicus		root	x			x
Stangeria eriopus	cycad	underground stem	x			x
Synaptolepis kirkii		root		x	x	
Tulbaghia alliacea		bulb			x	x
Warburgia salutaris	tree	bark, leaf, root	x	x	x	x

Source: Mander *et al.*, 1997.

Note: SC= reported as scarce in the market; LV= traded in large volumes; TW= traded widely; HV= reported to have a high value/price.

and concentration of trees with large diameters, even in forests where bark harvesting was prohibited. In areas where trees had become scarce, harvesters used ladders to access the upper part of the trunk to harvest bark, and even cut off upper branches. The impact of repeated harvest on species varies, *Faurea macnaughtonii*, for example, being more sensitive to regular ring-barking, while others, for example, *Warburgia salutaris*, have the ability for rapid regrowth. *Warburgia salutaris*, *Ocotea bullata* and *Curtisia dentata* coppice easily. Cunningham (1993a) also noted that ring-barking reduces seed set, and observed that this was especially the case with *Warburgia salutaris* and *Ocotea bullata*. Despite the ability of some species to be coppiced and to re-grow bark, the current level of exploitation was observed to be unsustainable, with the result being increased use of trees with smaller diameters and the importation of medicinal material from scarce species into KwaZulu-Natal (Cunningham, 1993a).

Table 26

Plant species identified as becoming scarce in KwaZulu-Natal by Cunningham (1993a)

Species	Identified by HTA members	Identified by urban herb traders	Identified by rural herbalists
Acacia xanthoploea		x	x
Albizia adianthifolia		x	
Alepidea amatymbica			x
Asclepias cucullata	x		
Begonia homonyma	x		
Bowiea volubilis	x	x	x
Cassine papillosa			x
Cassine transvaalensis		x	x
Cinnamomum camphora	x		
Crabbhea hirsuta		x	
Curtisia dentata	x	x	x
Erythrophleum lasianthum	x		
Eucomis sp.	x	x	x
Gunnera perpensa			x
Haworthia limifolia	x	x	x
Helichrysum sp.		x	x
Ocotea bullata	x	x	x
Pimpinella caffra			x
Scilla natalensis	x	x	x
Siphonochilus aethiopicus	x		
Strophanthus sp.		x	
Synaptolepis kirkii	x	x	
Terminalia sericea		x	
Warburgia salutaris	x	x	x

Source: Cunningham, 1993a.

Of the species mentioned above by Cunningham (1993a) and Mander *et al.* (1997), the following are recorded in the *Red Data List of Southern African Plants* (Hilton-Taylor, 1996): Vulnerable (V): *Ocotea bullata, Warburgia salutaris*; Rare (R): *Begonia homonyma, Stangeria eriopus;* Insufficiently Known (K): *Bowiea volubilis; Scilla natalensis*; Not threatened (nt): *Clivia miniata; Siphonochilus aethiopicus.* Furthermore, Cunningham (1993b) reports that the following species (in addition to those mentioned above) are regarded as being vulnerable and declining: *Dioscorea sylvatica, Bersama tysoniana, Ocotea kenyensis, Curtisia dentata, Pleurostylia capensis, Faurea macnaughtonii, Loxostylis alata, Mystacidium millarii,* and *Ledebouria hypoxidoides.*

An evaluation of the extent of medicinal use, price, quantities traded, and reports of scarcity for medicinal animal species revealed the following to be of particular note for conservation in South Africa, in order of importance: Ground Hornbill *Bucorvus leadbeateri*, Nile Crocodile, Black Mamba, Large-Spotted Genet *Genetta tigrina*, African Rock Python, White-throated Monitor Lizard *Varanus exanthematicus*, Nile Monitor Lizard, and all species of vulture (Mander *et al.*, 1997). A comprehensive review by Cunningham (1993a), which included evaluation of demand for medicine, conservation status, population status,

endemicity, ability to breed in captivity and protected status in South Africa, resulted in six medicinal animal taxa being accorded highest priority status for conservation (pangolins, Cape Vulture *Gyps coprotheres*, Lappet-faced Vulture *Torgos tracheliotis*, Bataleur Eagle *Terathopius ecaudatus*, Striped Weasel and Ground Hornbill). Three species were classed as lesser priorities (South African Hedgehog, Giant Girdled Lizard *Cordylus giganteus* and Aardvark), and seven species were categorized as being subject to an uncertain level of impact from trade (Serval, Brown Hyaena *Parahyaena brunnea*, Aardwolf *Proteles cristata*, Samango Monkey, Black Rhinoceros, Klipspringer, and African Rock Python). A list of South African animal species recorded as used in medicine is included in **Annex 1**.

Conclusion: South Africa has a large and growing market for wildlife medicinals. As urbanization increases, pressure on resources located near urban centres is similarly rising. The wildlife medicinals trade has seen an increase in commercial gatherers who are striving to meet growing urban demand. With many plants and animals becoming scarce in South Africa, imports of African species have become more commonplace, and exotic species are also becoming more frequently available, in particular plant species of Asian origin.

Many other countries in the region may soon arrive at the same level of urbanization as South Africa. As such, the need to address the issue of conservation and management of valued resources is even more critical. Means to promote economically viable propagation programmes should be developed, and efforts should be made to procure required animal medicinals from existing ranches or culling operations. It will be important for South Africa's new legislation and policies to promote an environment in which propagation and sustainable utilization of medicinals will be possible.

Recommendations

- Investigate market information systems to ascertain how to promote sustainably harvested medicinal products.
- Encourage sustainable harvesting and management of medicinal resources on farm lands.
- Promote the cultivation of high-value plant species in agricultural systems.
- Conduct research to identify medicinals which would be acceptable substitutes for slow-growing (or slow-reproducing) plant or animal species.

Madagascar

Background: *Area*: 594,180km^2. ***Population***: 11 602 000 in 1989, with a growth rate of 3.1% (IUCN, 1990). ***Flora***: Approximately 9345 vascular plant species described, of which 81% are endemic (Strahm, 1994).

It is said that in ancient times Madagascar was completely covered by forest. Now, however, 75% of that habitat has been changed by the expanding population, and the resulting activities of farming, cattle grazing, burning, and wood cutting (Bandringa, 1996). Sixty-three per cent of Madagascar is now used for agriculture and pasturage. Eastern rainforests, which include lowland and montane forests, have been subjected to intense agricultural conversion and are severely eroded and the vegetation in central Madagascar is now almost completely destroyed. In the west, some dry deciduous forest remains and is in need of protection, while in the south, xerophytic scrub supporting many endemic succulents is similarly under threat.

Madagascar is noteworthy for its many endemic animals, in particular lemurs.

During field research for this report (Quansah and Ranaivoarimanitra, 1996), one market in the northern part of the country (Ambanja), and two markets in Antananarivo (Analakely and Andravoahangy), were visited. In addition, markets surveyed in 1994 by Novy *et al.* (1994) (in Diego-Suarez,Moramanga, and around the Andohahela and Ankarafantsika Nature Reserves) were revisited.

Medical system: Traditional medical practice operates alongside Western medicine in Madagascar. Interest on the part of the government in traditional medicine has mostly focused on research, but since 1994 the Ministry of Health has launched several projects geared toward controlling the use and sale of traditional medicines, and has also initiated efforts to register and conduct a census of TMPs. The Ministry aims to encourage the formation of a traditional healers' association, and a parallel group for vendors of medicinal plants. Despite this, the practice of traditional medicine is not an approved medical system, and many TMPs do not openly practise in public. Nevertheless, traditional medicine remains extremely popular, and is often the sole option for consumers, as the price of Western pharmaceuticals is out of reach for many, and such products are not always readily available (Quansah and Ranaivoarimanitra, 1996).

Unlike markets in many countries, the medicinal markets of Madagascar are extensively organized. For example, in the market of Diego Suarez there is a committee composed of merchants who meet annually and set prices. Such committees may also establish links with local hospitals and seek collaboration with Western doctors (Novy *et al.*, 1994). In Antananarivo, the vendors in Analakely market are members of the Association des Assistants Médecins Malagasy (FMMM), created to promote traditional medicine and defend it against interests seeking to eradicate it. With the growing acceptance of traditional medical practice, this last objective has decreased in importance (Novy *et al.*, 1994).

Trade: Medicinal vendors were recorded as being numerous in most of the markets studied by Novy *et al.* (1994) and Quansah and Ranaivoarimanitra (1996). In Antananarivo, Novy *et al.* (1994) noted an increase in vendors at Analakely market since 1990, when 23 vendors of wildlife medicinals were counted, as opposed to 68 in 1994. Quansah and Ranaivoarimanitra (1996) counted a greater number of vendors at both Analakely and Andravoahangy markets than did Novy *et al.* (1994): 75 in the former, and 25 (as opposed to 13), respectively. Vendors worked six to seven days per week. A total of 200 plant species, said to be sourced from all over Madagascar, were sold by vendors in Andravoahangy, Analakely and Anosibe markets, according to Novy *et al.*, (1994). Quansah and Ranaivoarimanitra (1996) found four male and six female vendors at Ambanja market. They found about 100 different medicinal plants at the market, most of which were reportedly supplied by three individuals on a fortnightly basis. Seven vendors of wildlife medicinals sold exclusively in Ambanja, seven days per week, and the others travelled around to markets in neighbouring towns: such itinerant vendors were also noted by Novy *et al.* (1994).

Interviews with two TMPs at Analakely market revealed the identity of four extremely popular plant species, and the quantities estimated sold per year (Quansah and Ranaivoarimanitra, 1996) (**Table 27**).

While trade in medicinal plants appears widespread in Madagascar, there was little evidence of trade in animal species for medicinal purposes. During field research for this report, only one species, the Nile Crocodile, was recorded in trade. Oil from the crocodile was on sale for FMG40 000/litre to vendors, and for FMG75 000/litre to retail customers (Quansah and Ranaivoarimanitra, 1996).

International trade: A total of ten exporters of medicinal plants were identified, eight companies and two individuals (Quansah and Ranaivoarimanitra, 1996). Regulation of medicinal plant exports has, since 1989, been under the control of the Direction des Eaux et Forêts (DEF). Prior to 1989, the Ministry of Commerce regulated the trade, and this Ministry remains responsible for setting standard reference prices for various

exported species (including medicinal plants, seeds and essential oils). Figures for volumes and value of medicinal plant exports for the period 1972 to 1995 were available from the DEF, but are likely to be incomplete, as although manufacturers of plant extracts must register with the DEF, they may export their finished products without its authorization (Aubé, 1995; Ferraro and Ramandimbison, 1994). Data are available for 22 medicinal plant species, export figures for which, for the period 1990 to 1995, are presented in Table 28.

Table 27

Four medicinal plant species most frequently requested of two TMPs by customers in the Analakely market, Antananarivo, and estimated quantities sold (kg)

Species	Common name	Quantity sold by TMP no.1 (kg/yr)	Quantity sold by TMP no.2 (kg/yr)	Total sold by both TMPs (kg/yr)
Aframomum angustifolium	Longoza	300	120	420
Cedrelopsis grevei	Katrafay	200	100	300
Dracaena reflexa	Hasina	100	40	140
Sigesbeckia orientalis	Tsitiamivonto	150	75	225

Source: Quansah and Ranaivoarimanitra, 1996.

Table 28

Export volumes of medicinal plants from Madagascar, 1990-1995 (kg)

Species	1990	1991	1992	1993	1994	1995	Total (kg)
Catharanthus roseus roots	316 700	500 000	450 000	750 000	400 000	274 000	2 690 700
C. roseus leaves	133 060	100 200	25 270	18 000	64 044	58 000	398 574
C. roseus extract	8025	-	-	-	-	-	8025
Centella asiatica leaves	35 090	63 920	99 190	40 370	80 660	56 300	375 530
Drosera madagascariensis	15 000	4500	2000	21 100	15 145	18 220	75 965
Prunus africana extract	-	-	1180	1410	1000	1100	4690
Rauvolfia confertiflora roots	-	10 960	510	6000	-	35 000	52 470
Voacanga thouarsii seeds	4916	432	260	-	220	310	6138
Acacia decurens	-	-	-	-	-	600	600
Aphloia theaeformis	1000	-	1000	4000	1000	2230	9230
Calophyllum inophyllum oil	23	25	110	110	272	88	628
Calophyllum inophyllum nuts	-	-	-	8000	1600	1100	10 700
Harungana madagascariensis	-	900	-	1000	-	-	1900
Tabernaemontana modesta	2000	-	-	-	-	-	2000
Medemia nobilis (non-native)	8662	4058	10 480	8275	7933	6257	45 665
Moringa sp.	4570	-	1500	-	123	-	6193
Sigesbeckia orientalis	-	-	-	-	200	2200	2400
Uncarina sp.	-	-	-	50	-	-	50

Source: Direction des Eaux et Forêts data, in Rasoanaivo (1996).

- The Rosy Periwinkle *Catharanthus roseus* is valued in traditional medicine and in particular as a vermifuge, purgative, febrifuge, hemostatic and diuretic (Plotkin *et al.*, 1985). This Madagascan species is now pantropical, and is cultivated as an ornamental and for extraction of over 80 alkaloids. Since 1972, 13 039t of roots, 1501t of leaves, and 21t of extract have been exported from Madagascar for use in anti-cancer treatments (Rasoanaivo, 1996).
- *Catharanthus lanceus*, another Madagascan endemic, has similar alkaloidal properties, but exports of this species are recorded only between 1972 and 1986 (Rasoanaivo, 1996).
- *Centella asiatica* is a herb of Asian origin which, like the Rosy Periwinkle, is now pantropical. The leaves are exported for the manufacture of healing ointments, especially for treating scars.
- *Drosera madagascariensis*, a sundew, is used to produce cough syrups. The whole plant is harvested, from the wild, and is exported primarily to Europe. One dried plant weighs approximately 0.2g, indicating that many millions of plants are required to meet the annual export tonnage. *Drosera madagascariensis* is not cultivated commercially (Rasoanaivo, 1996).
- *Prunus africana*, an Afromontane tree species listed in CITES Appendix II since 1994, is an important Madagascan export. *Prunus africana* bark has been exported from Madagascar since the 1970s, and since 1992, Madagascar has started to produce extract, now exported instead of bark (Rasoanaivo, 1996; Walter and Rakotonirina, 1995). Approximately 750t of bark are required to produce the four tonnes of extract exported each year, and concern has been expressed on the part of the industry that harvest is unsustainable, often resulting in a mere 10% survival rate for trees affected, among which regeneration is negligible (Ravelomanantsoa, 1996). Exploitation first began in the north of Madagascar, and when supplies became depleted, harvest operations were moved to the "Central-East" region. At present this region is the only area where commercial extraction is taking place (Dawson and Rabevohitra, 1996; Walter and Rakotonirina, 1995).
- *Rauvolfia confertiflora*, a Madagascan endemic, is harvested for its reserpine and reserpiline content in the arid southern parts of the country. Fluctuations in export levels are apparently caused by difficulties in acquiring raw material. This species has been subjected to indiscriminate collection from the wild and has gradually become scarce (Rasoanaivo, 1996; Rasoanaivo, 1990).
- Seeds of the tree *Voacanga thouarsii* are harvested for their alkaloids, which are used in the treatment of cerebral disorders and to depress the central nervous system (Mabberley, 1997). This species is fairly abundant, and it is not thought that the current harvest from the wild is detrimental to the species (Rasoanaivo, 1990)

Plants of all other species listed in **Table 28** are collected from the wild. As with all of the species listed above, with the exception of *Catharanthus roseus*, cultivation has not been undertaken because of the high cost of investment, when profits are not assured (Rasoanaivo, 1996). While many of these exported species are in trade to Europe, an export trade in wildlife medicinals to the neighbouring islands of Comores and Reunion also exists. Of note is the export of *Enterospermum menabeensis* and the naturalized *Centella asiatica* to Comores from Majunga (Novy *et al.*, 1994). Novy *et al.* (1994) report that foreigners visit the markets in Diego Suarez and Majunga to purchase plant material.

International trade in animal medicinals from Madagascar was not documented during field research for this report.

Legislation: The DEF oversees the protection of flora and fauna in Madagascar. Permission for all harvesting of animal species and plant materials must be given by this department and international trade must be in accord with the requirements of CITES, to which Madagascar is Party. The law which pertains to this protection is the Inter-ministerial *Law No. 2915/87 of 27 June, 1987*. Madagascar has also adopted legislation promoting its traditional medicine, including *Ordinance 62-072*, 29 September 1962; *Ordinance 62-540*, 31 October 1962; and *Decree 62-046*, 24 February 1962 (Novy *et al.*, 1994).

Conservation: In the markets in Moramanga and in the regions of Ankarafantsika and Andohahela, the conservation status of 15 species was reported to have changed from abundant in 1994 to vulnerable. *Cerbera venenifera*, *Zanthoxylum* sp., *Brachylaena ramiflora*, *Cinnamosma* sp., *Kalanchoe integrifolia* and *Monanthotaxis* sp. were reportedly abundant in 1994, but have since become rare (Novy *et al.*, 1994; Quansah and Ranaivoarimanitra, 1996). Those medicinal plant species that are destructively harvested and are regarded as having a declining conservation status, are listed in **Table 29**.

Table 29

Medicinal plant species reportedly of conservation concern in Madagascar

Scientific name	Life form	Part used	Use	Notes
Adenia olaboensis	succulent	stem	liver ailments	recorded as vulnerable
Anisophyllea fallax	tree	root, stem	common cold	recorded as vulnerable
Anthocleista madagascariensis	tree	bark, leaf	antibiotic	recorded as vulnerable
Baudouinia rouxevillei	tree	stem	antidote	recorded as vulnerable
Brachylaena ramiflora	tree	stem, leaf	gynaecology	recorded as rare
Burasaia madagascariensis	-	stem	jaundice	recorded as vulnerable
Cabucala erythrocarpa	shrub	bark	aphrodisiac, anabolisant	recorded as vulnerable
Cerbera venenifera	tree	stem	cardiac tonic	recorded as rare
Cedrelopsis grevei	tree	bark	impotence	recorded as vulnerable
Cinnamosma macrocarpa	tree	bark	diarrhoea	recorded as rare
Chrysophyllum boivinanum	tree	stem	sterility	recorded as vulnerable
Cryptocarya (=Ravensara) aromatica	-	bark	influenza	recorded as vulnerable
Dalbergia madagascariensis	tree	stem	-	recorded as vulnerable
Delonix adansonioides	tree	-	antitussive	recorded as vulnerable
Drosera madagascariensis	herb	whole plant	antitussive	recorded as rare
Ficus pyrifolia	tree	stem	galactagogue	recorded as rare
Kalanchoe integrifolia	-	leaf, stem	influenza	recorded as rare
Pittosporum senacia	shrub	fruit, branch	antitussive, antibiotic	recorded as rare
Pittosporum viridiflorum	-	bark	albumin	recorded as vulnerable
Prunus africana	tree	bark	prostate problems	declining due to overharvest for international market
Rauvolfia confertiflora	tree	root	hypertension, tranquillizer	becoming scarce due to inter -national trade
Tarenna (=Enterospermum) madagascariensis	tree	stem	skin maintenance	recorded as vulnerable
Vanilla decaryena		leaf, stem	impotence	recorded as vulnerable
Vanilla madagascariensis		leaf, stem	aphrodisiac, anabolisant	recorded as vulnerable
Zanthoxylum sp.	-	stem	diarrhoea	recorded as rare

Source: Quansah and Ranaivoarimanitra, 1996; Rasoanaivo, 1996; Ravelomanantsoa, 1996.

The listing of *Drosera madagascariensis* is interesting in that the species occurs in large numbers, yet appears to be declining in some areas. This species is an important export, and it may be worth examining the resource base to ensure that trade is sustainable, despite the species's occurrence in significant numbers in parts of Madagascar and on mainland Africa.

Conclusion: Madagascar has an established trade in wildlife medicinals, despite lack of formal approval of traditional medicine by the government. Madagascar's Ministry of Health is increasingly involved in control of traditional medicine use and sale, but TMPs often do not practise openly. At the same time, sale of wildlife medicinals at markets appears to be on a significant scale in Madagascar, and vendors at markets visited had a wide range of of plants and preparations. Madagascar's medicinal plants are also valued in the international marketplace, and several exported plant species are either scarce or are traded in quantities that are causing concern. Most plant species used locally or internationally are wild-collected. Deforestation and land degradation are having a significant impact on flora and fauna in Madagascar, and coupled with harvest for the medicinals trade, these are resulting in declines for certain species, in particular the economically important *Prunus africana* which has been nearly eradicated in parts of its range. In order to ensure a future for Madagascar's medicinal plants, efforts will have to be undertaken to safeguard the most endangered sites, to increase controls for certain species where unsustainable and illegal harvest is a recurrent problem, and to encourage sustainable harvesting methods and cultivation for species as appropriate. In addition, as government support for traditional medicine appears to be on the rise, it will be important for collaboration to increase between the Ministry of Health and other relevant agencies, with traditional medicine associations, including those focused on marketing.

Recommendations

- Promote sustainable bark collection of species such as *Prunus africana.*
- Investigate the threats and impacts of wild-collection on medicinal plants exported in large quantities, such as *Rauvolfia confertiflora*, and promote cultivation, if necessary.
- Investigate possibility of increased controls on harvesting.

DISCUSSION

General

This review of trade in wildlife medicinals in east and southern Africa and Madagascar has resulted in findings with implications for conservation and management of natural resources in the region. Although the situation differs from country to country with regard to the status of the environment, national health needs, and the many pressures affecting flora and fauna, general themes were seen to apply.

- Traditional medicine is crucial to the region's health care. It is reported throughout the region to be both popular and important as a medical system - at most, to be the dominant medical system (e.g., in Sudan, Malawi, Mozambique, or Swaziland) or, at least, to have a definite role in health care and to be on the rise in popularity (e.g. in Kenya and South Africa). The acceptance of traditional medicine in the region is reflected by the integration of traditional medicine into government health care schemes in several countries, for example, in Lesotho, Namibia, Somalia, Sudan, Uganda, Zambia and Zimbabwe. Where official participation in government health policy does not occur, other governments in the region offer support or recognition of traditional medicine in their countries, for example, in Botswana, Eritrea, Madagascar and Mozambique. In other words, in the majority of countries surveyed, not only is traditional medicine favoured among the people, but there is a favourable attitude also at government

level. TMPs are beginning to practise more openly and associations of TMPs have been established in most countries in the region studied, with varying degrees of success. Such associations have taken an active role in revising or revoking antiquated legislation, influencing government policies, and promoting their practice and the overall reputation of traditional medicine. Legislation drawn up during the colonial era generally outlawed the practice of traditional medicine, but governments in the region today permit traditional practice by and large.

- Inseparable from the popularity and importance of traditional medicine in the region, is the fact that Western medicine is largely unavailable to a sizable portion of Africa's population, as its cost is unaffordable for many. Western health facilities are sparse in the rural areas, often limited to the minimum, whereas TMPs are frequently located in villages and can address health issues immediately. The ratios of doctors schooled in Western medicine to patients in some countries provide a useful indicator of the inaccessibility of Western medicine, and the relative availability of TMPs.

- Because of the status of traditional medicine in the region, it follows in turn that a large proportion of the region's population relies directly on wildlife medicinals for their health.

- Markets are an integral part of the trade structure for wildlife medicinals in most countries. This is a result of increased urbanization, which has distanced consumers from collection areas for medicinals. There are some exceptions, such as Malawi, which has less open trade in medicinals as patients demonstrate a preference for private consultation with TMPs. Because of increased urbanization, an increasing number purchase from vendors in markets, or directly from commercial collectors. Although many TMPs do collect their own wildlife medicinals, or rely on family members or apprentices to do this, in general, trade and sale appear to be growing throughout the region.

- Rising human populations were reported for most of the countries surveyed, and this fact, in conjunction with other factors, such as habitat loss and trade in wildlife for non-medicinal use, is likely to be responsible for increasing pressure on medicinal wildlife resources. As demand for wildlife medicinals increases, it will become necessary to increase the supply.

- The conservation status of some medicinal species is declining. While this can be attributed in part to habitat degradation and loss and use for non-medicinal purposes, it is also a result of exploitation for medicines. The vast majority of wildlife medicinals are collected from the wild, with no reports of wild animals being captive-bred for medicinal use, and minimal evidence of plant species cultivated expressly for use as medicine. Nevertheless, numerous tree species are valued for other purposes such as fodder, fuel, live fences or as ornamentals, and their cultivation is encouraged through the agriculture and forestry sectors, and on-farm cultivation is an aim that is pursued by countless government agencies and development organisations. Despite these efforts, when interviewed about sources, most vendors or TMPs reported that the plant species they used were collected from the wild rather than from cultivated plants.

- Efforts to stabilize or protect the populations of some species through national legislation have in most cases been ineffective. Laws protecting animal species appeared to be better known than those for plants, a feature which caused trade in animals to be covert in places. Plant laws were reported to be largely unknown by the majority of those interviewed and even where awareness existed, unregulated exploitation continued.

- Any decrease in supply of wildlife medicinals in east and southern Africa is a serious threat to the physiological and psychological well-being of millions of people in the region, and affects the overall health security of people in every country surveyed during this study. While priority species for conservation have been identified, development of strategies to ensure both their survival and the medicinal security of the region, will require efforts that go beyond species-specific actions, to include consideration of sustainable harvesting and propagation/captive-breeding options, to address land tenure issues, and to develop TMP associations and their relationships with government agencies, for example (see **Recommendations**).

Trade in plants

During this survey an attempt has been made to identify those species becoming scarce because of medicinal use, with the aim of developing strategies to avert continued and future scarcity. One hundred and two plant species have been identified as being of conservation concern in at least one of the countries surveyed. This total has been calculated on the basis of the lists of species reportedly at risk in each country, according to information gathered during research for this report, which in turn have been analysed according to the criteria outlined in phase III of **Methods**. The 102 species are presented in **Table 30**. From the extra information presented in the table, one can see that information for numerous species is lacking, which precludes a decision about whether the species merits further prioritization. Data on population size, in particular, is difficult to acquire. What is evident however, is that a significant number of species have a wide distribution, have broad habitat specificity, and in parts of their range are known to have large populations. In other words, species that are regarded as common, may be declining in parts of their range. Species such as Baobab *Adansonia digitata* or *Acacia seyal* have wide distributions, but their reported scarcity at local level should be regarded as a possible trend. As these species remain plentiful in large parts of their range, they represent an opportunity to practise sustainable management, and to experiment with sustainable harvesting techniques without the conservation risk present when dealing with less abundant species.

Species with narrow distributions, restricted habitat specificity and small population sizes may require additional initiatives to ensure that populations remain stable. Propagation may present a viable option, especially for those species known to have other values. Stimulating propagation will however have to take into consideration economic factors, as propagation will not be practised if it is not low-cost and a better option than wild collection.

An entry of "M" in the last column of **Table 30** denotes that a species is recommended to be managed for sustainable harvest; "P" denotes that a species recommended for propagation. Entries without sufficient information to ascertain whether management or propagation would be an appropriate means of addressing scarcity, require further data collection in order to be able to determine level of priority. Scores in **Table 30** are based on a point given for narrow distribution, restricted habitat, or small population, with three the highest score, one the lowest. Where information is insufficient no score has been given. Additional research would be helpful in ascertaining the level of priority for species for which information is lacking, particularly to assess population sizes.

Table 30 Evaluation of priority plant species in the region

Species	Countries reporting concern	Distribution	Habitat specificity	Population size	Score	Rec.
ZINGIBERACEAE						
Siphonochilus aethiopicus	SW, ZA	wide		small	1	M/P
AMARYLLIDACEAE						
Boophone disticha	ZA	wide	broad	medium	1	M
Clivia miniata	ZA	narrow		small	2	P
ASPHODELACEAE						
Aloe polyphylla	LE	narrow	restricted	small	3	P
Aloe sinkatana	SD	narrow	restricted		2	P
Haworthia limifolia	ZA	wide	restricted	small	2	P
DRACAENEACEAE						
Dracaena steudneri	ET	wide	restricted	large	1	M/P
HYACINTHACEAE						
Boweia volubilis	ZA	wide	broad	small	1	P
Eucomis autumnalis	LE, ZA	wide	broad	large	0	M
Scilla natalensis	LE, ZA	wide	broad	large	0	M
DIOSCOREACEAE						
Dioscorea dumetorum	TZ	wide	broad			M
ORCHIDACEAE						
Ansellia africana	MZ	wide	restricted	medium	2	P
Vanilla decaryena	MG					
V. madagascariensis	MG					
CUPRESSACEAE						
Juniperus procera	ER	narrow	restricted	large	2	M
STANGERIACEAE						
Stangeria eriopus	ZA	narrow	restricted	small	3	P
CANELLACEAE						
Cinnamosma macrocarpa	MG	narrow			1	
Warburgia salutaris	MZ, ZA, ZW, SW	wide	broad	small	1	M/P
W. stuhlmannii	KE	narrow	restricted	small	3	P
W. ugandensis	KE, UG	wide	broad			M/P
LAURACEAE						
Cryptocarya aromatica	MG					
Ocotea bullata	ZA	wide	restricted	medium	2	M/P
HYDNORACEAE						
Hydnora abyssinica	SD					
MENISPERMACEAE						
Burasaia madagascariensis	MG	narrow			1	
Jateorhiza bukobensis	MW					
PASSIFLORACEAE						
Adenia olaboensis	MG	narrow			1	
CUCURBITACEAE						
Kedrostis foetidissima	KE	wide	broad	small	1	M
Momordica balsamina	NA	wide	broad			M
DROSERACEAE						
Drosera madagascariensis	MG	wide	broad	large	0	M
BOMBACACEAE						
Adansonia digitata	SD, ER	wide	broad	large	0	M
MORACEAE						
Ficus pyrifolia	MG					
Milicia excelsa	TZ	wide	broad	large	0	M
EUPHORBIACEAE						
Acalypha fruticosa	TZ	wide	broad	large	0	M
THYMELAEACEAE						
Synaptolepis kirkii	ZA	wide	broad			M

Note: Rec = recommended action for addressing scarcity - M = species recommended to be managed for sustainable harvest; P = species recommended for propagation. Scores are based on points given for narrow distribution, restriced habitat, or small population.

Species	Countries reporting concern	Distribution	Habitat specificity	Population size	Score	Rec.
SAPOTACEAE						
Chrysophyllum boivinianum	MG	narrow	restricted		2	
GUTTIFERAE						
Psorospermum febrifugum	UG					
MYRSINACEAE						
Rapanea melanophloeos	ZA	wide	broad	large	0	M
CAPPARIDACEAE						
Boscia salicifolia	KE	wide	broad	large	0	M
B. senegalensis	SD					
Cadaba farinosa	TZ	wide				
Capparis erythrocarpos	UG					
SALVADORACEAE						
Salvadora persica	SD	wide	broad	large	0	M
PITTOSPORACEAE						
Pittosporum mannii	UG	wide	restricted		1	
P. senacia	MG					
P. viridiflorum	MG	wide	restricted	large	1	M
ANISOPHYLLEACEAE						
Anisophyllea fallax	MG					
CRASSULACEAE						
Kalanchoe integrifolia	MG	narrow			1	
ROSACEAE						
Hagenia abyssinica	ET	wide	restricted	medium	2	M/P
Prunus africana	KE, UG, MG	wide	restricted	medium	2	M/P
LEGUMINOSAE						
Acacia mellifera	TZ	wide	broad	large	0	M
Acacia seyal	SD	wide	broad	large	0	M
Aeschynomeme abyssinica	MW	wide	broad	large	0	M
Albizia brevifolia	NA	wide	broad			M
Baudouinia rouxevillei	MG	narrow			1	
Caesalpinia volkensii	KE	narrow	restricted		2	P
Cassia abbreviata	MW	wide	broad	large	0	M
Dalbergia madagascariensis	MG	narrow	restricted		2	
Delonix adansonioides	MG					
Dolichos trinervatus	MW	wide	broad			
Elephantorrhiza elephantina	ZW	wide	broad	large	0	M
E. goertzii	ZW	wide	broad			M
Erythrophleum suaveolens	MW	wide	broad			M
Lonchocarpus bussei	UG	wide	broad	medium	1	M
Swartzia madagascariensis	ZW	wide	broad	medium	1	M
PROTEACEAE						
Protea gaguedi	NA	wide	broad	small	1	
GUNNERACEAE						
Gunnera perpensa	LE	wide	medium	medium	2	
COMBRETACEAE						
Terminalia brownii	SD	wide	broad			M
CORNACEAE						
Curtisia dentata	ZA	wide	restricted	medium	2	
CELASTRACEAE						
Apodostigma pallens	UG					
Maytenus buchananii	UG					
M. senegalensis	UG	wide	broad	large	0	M
RHAMNACEAE						
Rhamnus prinoides	KE	wide	broad	large	0	M

Species	Countries reporting concern	Distribution	Habitat specificity	Population size	Score	Rec.
POLYGALACEAE						
Securidaca longipedunculata	UG, ET, KE	wide	broad	large	0	M
SAPINDACEAE						
Zanha africana	KE	wide	restricted	small	2	
BURSERACEAE						
Commiphora glaucesens	NA	narrow	broad	medium	2	M
C. mollis	NA	wide	broad	medium	1	M
ANACARDIACEAE						
Rhus lancea	ZW	wide	broad	large	0	M
Rhus natalensis	UG	wide	broad			M
Rhus vulgaris	UG	wide	broad			M
SIMAROUBACEAE						
Balanites aegyptiaca	SD, ER	wide	broad	large	0	M
MELIACEAE						
Khaya senegalensis	SD	wide	broad			M
PTAEROXYLACEAE						
Cedrelopsis grevei	MG					
RUTACEAE						
Haplophyllum tuberculatum	SD					
Harrisonia abyssinica	KE, TZ	wide	broad	large	0	M
Zanthoxylum chalybeum	KE, UG	wide	broad	large	0	M
Z. gillettii	KE	wide	restricted		1	M
Z. usambarense	KE	narrow	restricted		2	M/P
UMBELLIFERAE						
Alepidea amatymbica	ZW, LE, SW, ZA	wide	broad	large	0	M
Steganotaenia araliacea	KE, TZ, MW	wide	broad	large	0	M
GENTIANACEAE						
Anthocleista madagascariensis	MG					
APOCYNACEAE						
Cabucala erythrocarpa	MG					
Cerbera venenifera	MG					
Holarrhena pubescens	MW					
Rauvolfia confertiflora	MG	narrow	restricted		2	
R. oxyphylla	UG					
R. vomitoria	UG		broad	large		
ASCLEPIADACEAE						
Asclepias glaucophyllus	ZW					
Fockea angustifolia	NA	wide	broad	small	1	
Solenostemma argel	SD	narrow			1	
BORAGINACEAE						
Ehretia amoena	TZ	wide	broad	medium	1	
LAMIACEAE						
Hoslundia opposita	UG		broad	large		
Plectranthu pseudomarrubioides	KE			large		
PEDALIACEAE						
Harpagophytum procumbens	BW, NA	wide	broad	large	0	M
H. zeyheri	BW, NA	narrow	broad	large	1	M
COMPOSITAE						
Brachylaena ramiflora	MG					
Dicoma anomala	MW, LE	wide	broad	medium	1	M
Wedelia mossambicensis	TZ	wide	broad	large	0	
RUBIACEAE						
Gardenia spatulifolia	NA	wide	broad	medium	1	M
Rubia cordifolia	ZW	wide	broad			
Tarenna madagascariensis	MG					

The following species in **Table 30** have been afforded an IUCN degree of threat category (WCMC, *in litt.*, to N. Marshall, 1998):

Dalbergia madagascariensis	VU A1cd+2cd	*Juniperus procera*	LR: nt
Khaya senegalensis	VU A1cd	*Milicia excelsa*	LR: nt
Prunus africana	VU A1cd	*Pterocarpus angolensis*	LR: nt
Warburgia salutaris	CR A1bd, B1+2c, C2a		

Trade in animals

Annex 1 contains a listing of animal species used for medicinal purposes identified during this survey and in the literature. It is acknowledged that the number of animal species likely to be used in east and southern Africa is probably much higher, however further research is required to discover other species used.

Over 140 taxa have been identified during this study as being in use for medicinal purposes and, of these, 38 are listed in the *1996 IUCN Red List of Threatened Animals*, and 56 in the Appendices of CITES (see **Tables 31-34**). It is important to note that most of the animal species listed in the CITES Appendices that have been recorded as being traded in the region (**Table 34**) are recorded as being in trade locally, but if international trade for medicinal purposes has been reported it is so indicated.

Red-listed and CITES-listed animal species were not necessarily the species that were reported as being most difficult to obtain or scarce during research for this report: such species are listed in **Table 35,** with the countries that have reported them as priorities specified.

Several of the species in **Table 35** have been categorized with a degree of threat, yet there are also several species that have wide distributions and are not thought to be uncommon. Nevertheless, their scarcity may be an indication of decline, and this may be the case especially for Cape Pangolin, African Rock Python and Ostrich.

International trade

Demand for herbal medicines and products is growing around the world, and Africa exports medicinal plants to markets across the globe. The European and US herbal medicine markets are growing fast and in 1996, Europe imported in the region of 26 500t of medicinal and aromatic plant material from Africa, which was second only to Asia in exporting this volume to Europe in that year (Lange, D., 1998; Brevoort, 1996). Medicinal plants imported included *Catharanthus roseus* and *Rauvolfia vomitoria* from Madagascar and *Cinchona* bark and *Prunus africana* from the DRC (Goi *et al.*, 1997). In a survey of selected health food shops in the USA, however, none of the ten medicinal plants most in demand was of African origin (Brevoort, 1996). Countries identified during this study as exporting medicinal plant material outside Africa include Botswana, Kenya, Madagascar, Mozambique, Namibia, South Africa, Sudan, Tanzania and Uganda. Key plant species identified as being in overseas international trade include *Prunus africana* from Madagascar and Kenya, *Harpagophytum* spp. from Botswana and Namibia, *Aloe ferox* from South Africa, and *Drosera madagascariensis* and *Rauvolfia confertiflora* from Madagascar. *Prunus africana*, *Harpagophytum* spp., and *Rauvolfia confertiflora* are regarded as unsustainably harvested.

Despite the above, most international trade in wildlife medicinals in east and southern Africa occurs within the region, to satisfy local demand for traditional medicine, and exploitation for domestic use, rather than for export, constitutes the bulk of medicinal harvest in the region.

Table 31

IUCN degree of threat categories for mammals reported in medicinal use in east and southern Africa

Scientific name/common name	Degree of threat	Pressures
Calcochloris obtusitostris Golden Mole	LR:lc	non-medicinal uses unknown
Chrysopalax trevelyani Giant Golden Mole	EN B1+2c	non-medicinal uses unknown
Erinaceus frontalis South African Hedgehog	LR:lc	habitat destruction, road kill
Vulpes pallida Pale Fox	DD	retaliation for taking stock
Crocuta crocuta Spotted Hyaena	LR:cd	retaliation for taking stock; medicinal use unlikely to have significant impact
Parahyaena brunnea Brown Hyaena	LR:lc	retaliation for taking stock
Delphinus delphis Common Dolphin	LR:lc	pollution, incidental catch; medicinal use unlikely to have significant impact
Dugong dugon Dugong	VU A1cd	pollution, incidental catch, damage/death from collision with boats, hunting for meat; medicinal use causes a serious impact given low population size
Loxodonta africana African Elephant	EN A1b	trade in ivory, habitat reduction; medicinal use not significant
Diceros bicornis Black Rhinoceros	CR A1abc	medicinal use is having serious impact
Ceratotherium simum cottoni Northern White Rhinoceros	CR A1abc, D1	medicinal use is having serious impact
Ceratotherium simim White Rhinoceros	LR:cd	medicinal use is having serious impact
Equus africanus African Wild Ass	CR A1b	hunting for meat, habitat loss; medicinal use is having serious impact
Equus zebra zebra Cape Mountain Zebra	EN A1b	habitat loss, habitat fragmentation; medicinal use not significant
Phacochoerus africanus aelani Eritrean Warthog	EN A1acd, B1+2abd	hunting for meat, retaliation for crop raiding, trade in tusks; medicinal use could be having a serious impact
Phacochoerus aethiopicus delameri Somali Warthog	VU A2cd, B1+2abd	retaliation for crop raiding; medicinal use could be having a serious impact
Giraffa camelopardalis Giraffe	LR:cd	hunting for meat and hide, habitat loss; medicinal use not significant

Table 31 continued

Scientific name/common name	Degree of threat	Pressures
Tragelaphus oryx Eland	LR:cd	hunting for meat, habitat loss; medicinal use not significant
Tragelaphus strepsiceros Greater Kudu	LR:cd	hunting for meat, habitat loss; medicinal use not significant
Synceros caffer Buffalo	LR:cd	hunting for meat, habitat loss; medicinal use not significant
Aepyceros melampus Impala	LR:cd	hunting for meat, habitat loss; medicinal use not significant
Neotragus moschatus Suni	LR:cd	hunting for meat, habitat loss; medicinal use not significant
Redunca spp. Reedbuck	LR:cd	hunting for meat, habitat loss; medicinal use not significant
Raphicerus melanotis Cape Grysbok	LR:cd	hunting for meat, habitat loss; medicinal use not significant
Cephalophus natalensis Red Duiker	LR:cd	hunting for meat, habitat loss; medicinal use not significant
Connochaetes taurinus Wildebeest	LR:cd	hunting for meat, habitat loss; medicinal use not significant
Oreotragus oreotragus Klipspringer	LR:cd	hunting for meat, habitat loss; medicinal use not significant
Ourebia ourebi Oribi	LR:cd	hunting for meat, habitat loss; medicinal use not significant
Hystrix cristata African Crested Porcupine	LR:nt	habitat loss, collection of quills for North decoration and tourist curios; medicinal use not significant

Table 32
IUCN degree of threat categories for birds reported in medicinal use in east and southern Africa

Scientific name/common name	Degree of threat	Pressures
Gyps coprotheres Cape Griffin	VU A1ade+2de	poisoning; medicinal use significant
Eupodotis humilis Little Brown Bustard	LR:nt	hunting; medicinal use could be significant
Spheniscus demersus Jackass Penguin	LR:nt	medicinal use not significant
Morus capensis Cape Gannet	LR:nt	unknown

Table 33
IUCN degree of threat categories for reptiles reported in medicinal use in east and southern Africa

Scientific name/common name	Degree of threat	Pressures
Chelonia mydas Green Turtle	EN A1abd	hunting for meat, loss of nesting beaches, pollution, incidental catch; medicinal use could be significant in some countries (i.e. Eritrea for trade in genitalia)
Kinixys natalensis Natal Hinge-back Tortoise	LR:nt	habitat loss; impact of medicinal use unknown
Bradypodion nemorale Zululand Dwarf Chameleon	LR:nt	habitat loss
Bradypodion thamnobates Natal Midlands Dwarf Chameleon	LR:nt	habitat loss
Bradypodion setaroi Setaro's Dwarf Chameleon	EN B1+2c	habitat loss
Bufo amatolicus Amatola Toad	VU A2ce	habitat loss

Table 34

Animal species listed in the CITES Appendices that have been recorded in medicinal trade in east and southern Africa

Taxon	Cites Appendix	International medicinal trade reported
Bushbaby *Galago* sp.	II	No
Olive Baboon *Papio anubis*	II	No
Chacma Baboon *Papio ursinus*	II	No
Vervet Monkey *Chlorocebus aethiops*	II	No
Guenon	II	No
Samango Monkey *Cercopithecus albogularis*	II	Yes
Blue Monkey *Cercopithecus mitis*	II	No
Patas Monkey *Erythrocebus patas*	II	No
Cape Clawless Otter *Aonyx capensis*	III	No
Honey Badger *Mellivora capensis*	III	No
African Civet *Civettictus civetta*	II	No
Brown Hyaena *Parahyaena hyaena*	III	No
Aardwolf *Proteles cristatus*	II	Yes
Lion *Panthera leo*	I	Yes
Leopard *Panthera pardus*	II	No
Serval *Leptailurus serval*	II	Yes
Cape Fur Seal *Arctocephalus pusillus*	II	No
Common Dolphin *Delphinus delphis*	I/II	No
Dugong *Dugong dugon*	I/II	Yes
African Elephant *Loxodonta africana*	I	Yes
Black Rhino *Diceros bicornis*	I/II	Yes
White Rhino *Ceratotherium simum*	I	No
African Wild Ass *Equus africanus*	I	No
Cape Mountain Zebra *Equus zebra zebra*	II	Yes
Common Hippo *Hippopotamus amphibius*	II	No
Blue Duiker *Cephalophus natalensis*	II	Yes
Cape Pangolin *Manis temminckii*	II	No
Giant Pangolin *Manis gigantea*	III	No
North African Crested Porcupine *Hystrix cristata*	I/not listed	No
Ostrich *Struthio camelus*	II	Yes
Cape Griffin *Gyps coprotheres*	II	Yes
Lappet-faced Vulture *Torgos tracheliotis*	II	No
Fish Eagle *Haliaeetus vocifer*	II	No
Bataleur Eagle *Terathopius ecaudatus*	II	No
Bustard Otididae	II	No
Owl Strigidae	II	No
Jackass Penguin *Spheniscus demersus*	II	No
Purple Breasted Lourie *Tauraco corythaix*	III	No
Hadada Ibis *Hagedashia hagedash*	I	Yes
Green Turtle *Chelonia mydas*	II	No
Leopard Tortoise *Geochelone pardalis*	II	No
Hinged Tortoise *Kinixys* spp.	I/II	Yes
Nile Crocodile *Crocodylus niloticus*	II	No
Chameleon *Chameleo* spp.	II	No
Chameleon *Bradypodion* spp.	II	No
Girdled Lizard *Cordylus* spp.	II	No
Nile Monitor *Varanus niloticus*	II	No
White-throated Monitor *Varanus exanthematicus*	II	Yes
African Rock Python *Python sebae*		

Table 35

Priority animal species in the region

Common name	Countries reporting
Aardvark	South Africa, Mozambique
African Civet	Eritrea, Tanzania
African Rock Python	Malawi, Mozambique, Namibia, South Africa
African Wild Ass	Eritrea
Bataleur Eagle	South Africa
Black Mamba	South Africa
Black Rhino	Kenya
Bustards	Somalia
Cape Pangolin	Tanzania, Malawi, Mozambique, Namibia, South Africa
Dugong	Kenya
Giant Girdled Lizard	South Africa
Green Turtle	Eritrea, Kenya, Tanzania
Ground Hornbill	South Africa
Large-Spotted Genet	South Africa
Leopard	Eritrea, Malawi
Leopard Tortoise	Namibia
Lion	Uganda, Malawi, Mozambique
Nile Crocodile	Sudan, South Africa
Nile Monitor	South Africa
Northern White Rhino	Sudan
Ostrich	Sudan, Somalia, Eritrea
South African Crested Porcupine	Malawi
South African Hedgehog	Malawi, South Africa
Spotted Hyaena	Eritrea, Malawi
Striped Weasel	South Africa
Warren's Girdled Lizard	Mozambique
Warthog (Eritrean)	Eritrea
Warthog (Somali)	Eritrea
White-throated Monitor	South Africa
Vultures	South Africa

CONCLUSIONS AND RECOMMENDATIONS

Noting that the conservation of medicinal wildlife resources in east and southern Africa will need to extend beyond species-specific actions, recommendations for the conservation of these resources resulting from the findings of research relate to the themes of conservation, management, awareness, regulation and research. They have been drawn up based on the following observations.

- As demand for wildlife medicinals increases, it will become necessary to increase the supply.
- Increasing supply will have to entail a variety of methods including sustainable harvest and propagation/captive-breeding.
- Land tenure issues already do and will continue to affect the success of sustainable harvesting schemes.

- TMPs and TMP associations represent a promising forum for education and awareness, and discussing and developing strategies to address the issue of declining medicinal resources.
- Many TMP associations are in their infancy and have yet to develop substantial memberships or fruitful relationships with government agencies, and therefore are not in a good position to stimulate action on a national level. Some countries though do have sizable associations that can serve as examples (such as Zimbabwe and Zambia).
- Exploitation of flora and fauna for medicinal purposes must be considered within the larger context of habitat degradation and loss, and other forms of exploitation such as for timber, hides, meat, etc.
- There is still much that we do not know about the wildlife medicinals trade and its impacts, and research will be required on many levels.
- Solutions to overexploitation of medicinals must go hand in hand with increasing supply; insufficient access to traditional medicines will result in a decreased health status in the region, as well as a decrease in the status of the environment.
- Options such as community management of resources to meet external demand, as well as commercial production operations, should be considered as a means of increasing supply.

Addressing these issues and concerns, and implementing the recommendations discussed below, will require action on a multitude of levels by a range of institutions. TMP associations, if they were to become more organized and active, could play a key role, but at present they are often local in their focus. Some of the problems and proposed solutions to over-exploitation of wildlife medicinals go beyond the scope of these associations, and it may be appropriate to encourage the formation of a regional association, institution or secretariat, with the aim of harnessing existing knowledge and information, and catalyzing national associations to form links needed with other sectors and operations (for example Ostrich ranchers' associations or timber companies), to address the issue of supply and sustainability. Some of the recommendations discussed below could be prompted or addressed by such a regional body.

Conservation

This survey has documented the use of a number of threatened species as being valued for medicinal use. Some of these species are considered to be Critically Endangered, and any use should be discouraged. For example, the African Wild Ass is used in Eritrea, and medicinal use combined with other threats such as hunting, harassment and interbreeding with domestic donkeys is having a serious impact on the species. This species, as well as other animals listed in **Table 31** and plants threatened to a similar degree, for example, *Warburgia salutaris*, would benefit from increased protection as well as from increased attention paid to medicinal use as a threat. Again in Eritrea, use of the endangered Eritrean Warthog could be extremely detrimental to a taxon already suffering considerably from habitat loss, hunting and retaliation for crop-raiding.

In the strictest sense, one can use this report to identify threatened species and add one more threat to the reasons supporting remedial conservation action. For Endangered and Critically Endangered Species, efforts should be made to discourage use of the species for medicinal purposes, until the status of the species improves. This recommendation is also applicable on a local level to other species that have been described with a less serious degree of threat, such as the Dugong, which for example in Kenya occurs in very low numbers.

Where possible, efforts should be made to improve the status of threatened species through propagation or

captive breeding, in order to supply the market with more medicinal materials, and to reduce the threat to populations remaining in the wild. For threatened plant species, this option is one that in some cases benefits from research undertaken by horticulturalists. For some species, techniques are already tested and well-known. What is not known in most cases though is the economic viability of large scale production. For animal medicinals, only a few species have been produced on a commercial scale through captive breeding or ranching (Nile Crocodile and Ostrich). For other animal species, there is minimal information about carrying out breeding on a scale that might reduce medicinal impact in the wild.

Specific options coming under the topic of conservation include:

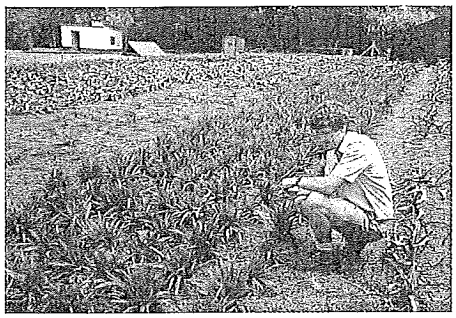
- strict protection for threatened species;
- propagation and captive breeding to increase supply/reduce pressure on wild populations;
- ascertain whether species on a national level require strict protection, or can be sustainably harvested, or need to be assisted through propagation and captive breeding;
- ensure that wildlife authorities and other government agencies charged with protection are aware that species under their control are being exploited for medicinal purposes;
- review legislation and controls to ensure that species deserving of strict protection are actually receiving it.
- promote sustainable harvesting of species (see **Management** section below).

Management

The majority of species identified during this survey and especially the plant species, are not threatened and are actually widely distributed taxa with large populations in parts of their range. At the same time a number of these taxa are experiencing declines, which can be attributed to over-exploitation for a variety of factors including harvest for timber, gums and resins, cordage, and medicine. Aside from propagation practised at the household level, it is not practical to promote propagation of such common and widespread species, and would be more sensible to explore sustainable harvesting methods and systems for target species. Key issues to be considered are (i) how to promote the practice of sustainable harvesting methods, and (ii) how to address harvest methods when ownership rights require clarification.

Co-operatives aimed at sustainably harvesting wildlife medicinals:
In order to further sustainable management within the context of communal land ownership, or lack of ownership, it is recommended that co-operatives be established to investigate and implement the commercial exploitation of sustainably harvested medicinal resources. A co-operative could include membership by TMPs but might be more likely to be a community-oriented effort geared towards harvesting resources sustainably, and commercially, for an urban market. Such a co-operative could be modelled on community-based efforts already well-known in the region, such as Campfire.

Establishment of propagation or captive-breeding facilities:
For species that may be uncommon, illegal to harvest (or only occurring in protected areas), efforts to investigate the possibility of commercial ranching for medicinal purposes should be undertaken. The African Rock Python is in demand in almost all countries surveyed, and has been identified as difficult to acquire in several. This species could be used as a test case,



Credit: A.B. Cunningham

The Silverglen Nursery, under the municipality of Durban, South Africa, has been cultivating medicinal plants and working with traditional healers for over 15 years.

although it should form part of a greater initiative aimed at looking at a host of species, their ease of breeding, and the economic viability of setting up a commercial operation to supply (sell) wildlife medicinals to consumers. For some species, techniques and economics are well-known (Ostrich and Nile Crocodile), and these species could be included in such a scheme.

Identify the medicinal by-products that already exist:
Ranching operations for Ostrich and Nile Crocodile are numerous throughout east and southern Africa. There may be by-products from these operations that could go towards supplying traditional medicinal demand - Nile Crocodile ranches that produce hides might be able to supply fat for medicine, for example. This option should be explored, as the medicinal end-market might be a profitable destination for by-products, and would also serve to reduce pressure on wild populations. There may well be other sorts of operations that could yield medicinal products, for example, culling for game meat or timber operations.

Awareness

The growing scarcity of medicinal plants in particular is a familiar topic among TMPs, and they represent a concerned body that in many countries would be enthusiastic about promoting propagation and awareness about the need for conservation and sustainable use. In countries lacking associations, government agencies may be the appropriate institutions to promote awareness, but involvement should include ministries which do not traditionally participate in natural resource conservation issues, such as ministries of health. Efforts should be made to communicate the issue of scarcity to all levels of government, to TMPs and existing associations, to consumers, and to the public in general. The message that sustainably harvested, propagated/captive-bred, or "green" products, are preferable given the current situation of declining populations of valued species could also be communicated, but before attempting to address the "green" marketing issue, research should be carried out to assess the sorts of products to which people might be receptive. Similarly, methods of communicating information to the varied audience in the region should be considered carefully.

Regulation

Record-keeping for internationally traded wildlife medicinals is insufficient in many countries, and non-existent in others. Efforts should be made to improve reporting of international trade in CITES-listed species, as indicated by the unaccounted presence of South African manufactured products on sale in Namibia, Botswana, Mozambique, Malawi and Zimbabwe. In addition, many government agencies are unaware that plant medicinals should be regulated, and occasionally, even if awareness exists, legislation does not. As medicinal plants as a commodity receive minimal regulatory attention, there is scanty knowledge of actual exports, volumes, species and impacts. In Tanzania, for example, the quantities exported may be large, but at present the authorities are unable to assess the situation despite concern from some quarters. Without sufficient controls on plant exports beyond the simplistic phytosanitary checks that often do not even identify the species exported, countries may be losing significant revenue, and at the same time may be allowing plant populations to decline. It would be worthwhile to investigate the systems that exist, if any, relating to export duties imposed upon medicinal plant exports. It is possible that countries are not charging the appropriate duties on exports because the true value of the export is not known to the authorities.

There exists the opinion that Customs officers and wildlife rangers spend an unnecessary amount of time on a burdensome task in issuing import and export permits for small quantities of material, or for common

species. This study has revealed, however, that many individuals (and agencies) charged with regulation, or implementation of legislation, are unaware that medicinal products, and especially traditional medicinal products, are materials that should be subject to existing wildlife legislation and controls. Regulatory agencies should be made aware of the trade in wildlife medicinals, and its implications (such as declining populations and reduced medicinal security for the region as a whole), and their role in controlling it.

Research

Information on many species identified as being of medicinal value is lacking, particularly for plants. Data are deficient on status, and extent and impact of utilisation. Surveys that would be useful are listed below:

- Carry out surveys to ascertain the population status of internationally traded plant species such as *Harpagophytum* spp., *Rauvolfia confertiflora, Prunus africana*, and *Drosera madagascariensis*.
- Conduct surveys on the trade in animal medicinals in order to ascertain volumes traded and impact. Target taxa include sea turtle and pangolins.
- Investigate other impacts that are causing medicinally valuable species to become depleted, such as the effects of the timber trade in Zambia for example on *Pterocarpus angolensis*, and the effects of gum collection on species such as *Boswellia papyrifera* and *Acacia senegal*.
- Carry out a survey of reptiles, in particular on tortoises, which may be used in large quantities, but there is no information on species used, volumes traded, or the impact on the populations.
- Conduct a botanical review of the priority plant species to ascertain relevant aspects of distribution, taxonomic uniqueness and chemical interest around the world.
- Investigate the trade in substitutes, such as imitation fats, to ascertain what they are, how and when they are used, and the possibility of promoting substitutes as a conservation measure. While information is available on the situation in South Africa, little is known about other countries in the region.

Implementation of the recommendations outlined above will in many instances require dedicated and well-organized TMP associations, natural resource co-operatives, or as suggested earlier, a regional body charged with linking national associations, information and actions. There is great potential throughout the east and southern African region to act, as the conservation of wildlife medicinals is an objective common to many sectors and levels of society. The realization that the number of species valued as medicines is extremely large, and that a range of strategies are necessary to conserve and manage them, actually represents an opportunity for natural resource managers and stakeholders. Medicinal species, in particular plants, have demonstrated potential for sustainable use, yet are affected by exploitation for short term gain, for example, for timber harvest. The option of harvesting species sustainably for medicinal products, with its possibility of yielding long-term rewards valued by the community, presents an opportunity to offset some of the threats that are now contributing to habitat destruction and selective exploitation of species. Medicinal use and the need for health care is a topic that everyone can understand and relate to, and therefore may be a suitable means of achieving sustainable resource use. At the same time, conservation of medicinal resources is a challenge that will require commitment on the part of many sectors, including the international marketplace, government agencies, primary healthcare organizations, and many others. Successful collaboration between the health and natural resource sectors can be a solid foundation for reaching the inseparable goals of medicinal security and sustainable resource use in the region.

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ANNEX 1

Animal medicinals recorded in use in east and southern Africa

COMMON NAME	SCIENTIFIC NAME	PART USED	USE	COUNTRY	REFERENCE
MAMMALIA INSECTIVORA **Chrysochloridae** Golden Mole	*Calcochloris obtusitostris*	skin	skin disease	Mozambique	Guissamulo 1996
Giant Golden Mole	*Chrysopalax trevelyani*	whole	remedy for sorcery	South Africa	Mander *et al.* 1997
Erinaceidae Four-toed Hedgehog	*Erinaceus albiventris*	unspecified	unspecified	Tanzania	Kahatano 1997
South African Hedgehog	*Erinaceus frontalis*	quill skin unspecified unspecified	witchcraft good luck good luck good luck	Malawi Malawi Zimbabwe South Africa	Maliwichi 1996 Maliwichi 1996 Gelfand *et al.* 1985 Cunningham 1993a
CHIROPTERA Bat	unspecified	blood meat brain whole whole unspecified unspecified unspecified unspecified	aphrodisiac neo-natal deaths paralysis mental illness whooping cough protective charm witchcraft to treat babies mental disorders	Ethiopia Ethiopia Sudan Ethiopia Sudan South Africa South Africa South Africa South Africa	Desalegn *et al.* 1996 Desalegn *et al.* 1996 MAPRI 1997 Desalegn *et al.* 1996 MAPRI 1997 Cunningham 1993a Cunningham 1993a Cunningham 1993a Cunningham 1993a
PRIMATES **Lorisidae** Bushbaby	*Galago* sp.	unspecified unspecified unspecified unspecified unspecified unspecified	protection love charm love charm charm for athletes stop babies crying fits	South Africa Malawi South Africa South Africa South Africa South Africa	Cunningham & Zondi 1991 Maliwichi 1996 Cunningham 1993a Cunningham 1993a Cunningham & Zondi 1991 Cunningham & Zondi 1991
Cercopithidae Guenon	unspecified	meat meat	polio good yields	Kenya Kenya	Emerton 1991 Emerton 1991
Baboon	unspecified	meat urine fontanelle toes skull skin hands unspecified	malaria prophylaxis aphrodisiac depressed fontanelle protective charm unspecified unspecified unspecified unspecified	Kenya Zimbabwe Zimbabwe Malawi Zimbabwe Zimbabwe Swaziland Zimbabwe	Emerton 1991 Gelfand *et al.* 1985 Gelfand *et al.* 1985 Maliwichi 1996 Mukamuri 1996 Mukamuri 1996 Van Damme 1996 Mukamuri 1996
Olive Baboon	*Papio anubis*	fat	broken bones	Eritrea	Hagos *in litt.* 1997
Chacma Baboon	*Papio ursinus*	unspecified unspecified unspecified unspecified	protective charm court case charm stickfight charm headache	South Africa South Africa South Africa South Africa	Cunningham & Zondi 1991 Cunningham & Zondi 1991 Cunningham & Zondi 1991 Cunningham & Zondi 1991

Vervet Monkey	*Chlorocebus aethiops*	meat dung unspecified unspecified unspecified unspecified	mental illness sleeping sickness chest infection ear infection love charm charm for goats	Sudan Ethiopia South Africa South Africa South Africa South Africa	MAPRI 1997 Desalegn *et al.* 1996 Cunningham & Zondi 1991 Cunningham & Zondi 1991 Cunningham & Zondi 1991 Cunningham & Zondi 1991
Samango Monkey	*Cercopithecus albogularis*	skin hands bone unspecified	diagnosing diagnosing diagnosing unspecified	Mozambique Mozambique Mozambique Botswana	Guissamulo 1996 Guissamulo 1996 Guissamulo 1996 Mbewe 1996
Blue Monkey	*Cercopithecus mitis*	toes	protective charm	Malawi	Maliwichi 1996
Patas Monkey	*Erythrocebus patas*	meat	mental illness	Sudan	MAPRI 1997
Monkey	unspecified	unspecified skin skull intestines	witchcraft protection unspecified unspecified unspecified	Kenya Zimbabwe Zimbabwe Zimbabwe	Emerton 1991 Mukamuri 1996 Mukamuri 1996 Mukamuri 1996
CARNIVORA **Canidae** Jackal	*Canis* spp.	teeth meat meat	wounds throat diseases abdominal dropsy	Swaziland Ethiopia Ethiopia	Van Damme 1996 Desalegn *et al.* 1996 Desalegn *et al.* 1996
Side-striped Jackal	*Canis adustus*	heart skin/nails	epilepsy ward off spirits	Uganda Uganda	Ginsberg & Macdonald 1990 Ginsberg & Macdonald 1990
Pale Fox	*Vulpes pallida*	meat	asthma	Sudan	MAPRI 1997
Fox	unspecified	meat	mental illness	Uganda	Amai 1996
Mustelidae Zorilla	*Ictonyx striatus*	skin	aphrodisiac	Malawi	Maliwichi 1996
Striped Weasel	*Poecilogale albinucha*	whole/fat skin	good luck love charm	South Africa South Africa	Cunningham & Zondi 1992 Cunningham & Zondi 1992
Cape Clawless Otter	*Aonyx capensis*	unspecified	insanity	South Africa	Cunningham 1993a
Mellivoridae Honey Badger	*Mellivora capensis*	dung heart fur unspecified unspecified	unspecified unspecified unspecified hunting dog charm protective charm	Tanzania Tanzania Tanzania South Africa South Africa	Kahatano 1997 Kahatano 1997 Kahatano 1997 Cunningham 1993a Cunningham 1993a
Viverridae Genet	*Genetta* sp.	skin unspecified unspecified	unspecified stick fight charm eye treatment	Mozambique South Africa South Africa	Guissamulo 1996 Cunningham 1993a Cunningham 1993a
Small-spotted Genet	*Genetta genetta*	skin skin	against sorcery TMP clinic ornament	South Africa South Africa	Mander *et al.* 1997 Mander *et al.* 1997
Large-spotted Genet	*Genetta tigrina*	unspecified	unspecified	South Africa	Williams *et al.* 1996
African Civet	*Civettictus civetta*	musk musk musk skull fur	asthma urinary disorders urinary disorders migraine decoration	Ethiopia Ethiopia Eritrea Tanzania Tanzania	Desalegn *et al.*1996 Desalegn *et al.* 1996 Hagos *in litt.* 1996 Kahatano 1997 Kahatano 1997
Hyaenidae Hyaena	unspecified	unspecified fat teeth	unspecified unspecified expel evil spirits	Somalia Botswana Kenya	Farah 1997 Mbewe 1996 Simiyu *et al.* 1996

Spotted Hyaena	*Crocuta crocuta*	eyebrow	induce sleep	South Africa	Kingdon 1974
		hair/skin	emetic	South Africa	Kingdon 1974
		gland paste	sorcery	South Africa	Kingdon 1974
		tail	against robbery	Malawi	Maliwichi 1996
		lips	aphrodisiac	Malawi	Maliwichi 1996
		nose	promote wisdom	Uganda	Kingdon 1974
		nose	cure blindness	Uganda	Kingdon 1974
		fat	arthritis	Sudan	MAPRI 1997
		dung	laying of spirits	Uganda	Kingdon 1974
		dung	insanity	Ethiopia	Desalegn *et al.* 1996
		liver	epilepsy	Ethiopia	Desalegn *et al.* 1996
		unspecified	unspecified	Zambia	Muswema & Mpengula 1996
		unspecified	unspecified	South Africa	Cunningham 1993a
Brown Hyaena	*Hyaena brunnea*	unspecified	unspecified	South Africa	Cunningham 1993a
Striped Hyaena	*Hyaena hyaena*	fat	arthritis	Sudan	MAPRI 1997
Aardwolf	*Proteles cristatus*	meat	heart pain	Ethiopia	Desalegn *et al.* 1996
Felidae					
Lion	*Panthera leo*	claw	good luck	Tanzania	Kahatano 1997
		skin	regalia	Uganda	Kingdon 1974
		skin	bravery/courage	Zambia	Muswema & Mpengula 1996
		skin	protection	Kenya	Simiyu *et al.* 1996
		fat	allergies	Kenya	Simiyu *et al.* 1996
		fat	decoration	Zambia	Muswema & Mpengula 1996
		fat	sore muscles	Tanzania	Kahatano 1997
		fat	depressed fontanelle	Zimbabwe	Gelfand *et al.* 1985
		fat	AIDS	Uganda	Amai 1996
		fat	unspecified	Botswana	Mbewe 1996
		fat	unspecified	Zimbabwe	Mukamuri 1996
		meat	courage	Sudan	MAPRI 1997
		heart	bravery	Zimbabwe	Gelfand *et al.* 1985
		gall bladder	charm	Zimbabwe	Gelfand *et al.* 1985
		teeth	to be a good hunter	Mozambique	Guissamulo 1996
		tarsal	diagnosing	Mozambique	Guissamulo 1996
		mane	bring respect	Mozambique	Guissamulo 1996
		urine	bring respect	Mozambique	Guissamulo 1996
		voice box	improve potency	Malawi	Maliwichi 1996
		voice box	bravery	Malawi	Maliwichi 1996
Leopard	*Panthera pardus*	meat	for charisma	Kenya	Simiyu *et al.* 1996
		skin	regalia	Uganda	Kingdon 1974
		skin	worn by possessed	Zimbabwe	Mukamuri 1996
		skin	asthma	Malawi	Maliwichi 1996
		skin	bravery	Malawi	Maliwichi 1996
		heart	diarrhoea	Kenya	Emerton 1991
		heart	measles	Kenya	Emerton 1991
		heart	cholera	Kenya	Emerton 1991
		claws	prevent miscarriage	Eritrea	Hagos *in litt.* 1997
		claws	repel evil spirits	Eritrea	Hagos *in litt.* 1997
		tail	call home a relative	Uganda	Kingdon 1974
		eye	see distant people	Zambia	Muswema & Mpengula 1996
		unspecified	stick fight charm	South Africa	Cunningham 1993a
		unspecified	court case charm	South Africa	Cunningham 1993a
		unspecified	protective charm	South Africa	Cunningham 1993a
		unspecified	unspecified	Swaziland	Van Damme 1996
Lion Leopard		fat	terrorising people	South Africa	Cunningham & Zondi 1991
		fat	dislocated bones	Kenya	Emerton 1991
		fat	swollen legs	Botswana	Mbewe 1996
		fat	polio	Ethiopia	Desalegn *et al.* 1996
		fat	gaining respect	Swaziland	Van Damme 1996
		fat	good luck	Zimbabwe	Gelfand *et al.* 1985
Cheetah	*Acinonyx jubatus*	unspecified	hunting dog charm	South Africa	Cunningham 1993a
		unspecified	unspecified	Zimbabwe	Mukamuri 1996

Serval	*Leptailurus serval*	skin skin	decoration unspecified	Zimbabwe South Africa	Gelfand *et al.* 1985 Cunningham & Zondi 1991
African Wildcat	*Felis libyca*	unspecified	protective charm witchraft	South Africa South Africa	Cunningham 1993a Cunningham 1993a
PINNIPEDIA **Phocidae** Cape Fur Seal	*Arctocephalus pusillus*	fat fat fat head head unspecified unspecified	unspecified chest infections ear infections protective charm hunting dog charm unspecified strength	Botswana South Africa South Africa South Africa South Africa Namibia Swaziland	Mbewe 1996 Cunningham & Zondi 1991 Cunningham & Zondi 1991 Cunningham & Zondi 1991 Cunningham & Zondi 1991 Mander *et al.* 1996 Green 1994
CETACEA Whale	unspecified	fat fat bone bone	unspecified body swelling protective charm charm for crops	Mozambique Tanzania South Africa South Africa	Guissamulo 1996 Kahatano 1997 Cunningham 1993a Cunningham 1993a
Delphinidae Common Dolphin	*Delphinus delphis*	unspecified unspecified unspecified unspecified	witchcraft charm for cattle charm for crops chest/ear treatment	South Africa South Africa South Africa South Africa	Cunningham 1993a Cunningham 1993a Cunningham 1993a Cunningham 1993a
SIRENIA **Dugongidae** Dugong	*Dugong dugon*	meat meat meat meat fat fat fat fat fat bone bone bone bone bone bone bone bone bone bone bone bone	arthritis influenza tetanus general weakness dandruff labour pains asthma stomach ailments dental abcesses cauterise wounds respiratory infections help expel afterbirth against evil spirits toothache tonsilitis hiccoughs bilharzia labour pains mumps arthritis against evil spirits	Kenya Kenya	Kendall 1986 Kendall 1986
PROBISCIDIA **Elephantidae** African Elephant	*Loxodonta africana*	skin skin skin skin bone fat fat fat foot foot tusk dung dung dung dung unspecified unspecified	unspecified make baby strong gain respect leprosy good luck good luck gain respect unspecified good luck respect obtain money unspecified unspecified dilate cervix unspecified love charm charm for cattle	Zimbabwe Zimbabwe Mozambique Malawi Kenya Kenya Mozambique Botswana Zimbabwe Zimbabwe Zimbabwe Zimbabwe Zimbabwe Zimbabwe Botswana South Africa South Africa	Mukamuri 1996 Gelfand *et al.* 1985 Guissamulo 1996 Maliwichi 1996 Simiyu *et al.* 1996 Simiyu *et al.* 1996 Guissamulo 1996 Mbewe 1996 Gelfand *et al.* 1985 Gelfand *et al.* 1985 Gelfand *et al.* 1985 Gelfand *et al.* 1985 Mukamuri 1996 Gelfand *et al.* 1985 Mbewe 1996 Cunningham 1993a Cunningham 1993a

PERISSODACTYLA **Rhinocerotidae** Black Rhinoceros	*Diceros bicornis*	unspecified unspecified unspecified	protective charm hunting dog charm skin problems	South Africa South Africa South Africa	Cunningham 1993a Cunningham 1993a Cunningham 1993a
Northern White Rhino	*Ceratotherium simum cottoni*	horn	poison antidote	Sudan	MAPRI 1997
Rhinoceros	unspecified	dung	unspecified	Zimbabwe	Mukamuri 1996
Equidae African Wild Ass	*Equus africanus*	fat/meat/blood fat/meat/blood fat/meat/blood fat/meat/blood fat/meat/blood fat/meat/blood	TB backache rheumatism constipation boneache mineral deficiencies	Ethiopia, Somalia, Eritrea	Moehlman p.c. 1997 Moehlman p. c. 1997 Moehlman p. c. 1997 Moehlman p. c. 1997 Moehlman p. c. 1997 Moehlman p. c. 1997
Burchell's Zebra	*Equus burchelli*	fat fat unspecified unspecified	chest problems asthma protective charm mental disorders	Tanzania Tanzania South Africa South Africa	Kahatano 1997 Kahatano 1997 Cunningham 1993a Cunningham 1993a
Cape Mountain Zebra	*Equus zebra zebra*	fat fat	protective charm mental disorders	South Africa South Africa	Mander *et al.* 1997 Mander *et al.* 1997,
HYRACOIDAE **Procaviidae** Rock Hyrax	*Procavia* spp.	blood unspecified	remove phobias unspecified	Ethiopia Swaziland	Desalegn *et al.* 1996 Van Damme 1996
	Procavia capensis	meat meat meat	diabetes jaundice ascites	Sudan Sudan Sudan	MAPRI 1997 MAPRI 1997 MAPRI 1997
Tree Hyrax	*Dendrohyrax arboreus*	whole hair stomach	witchcraft coughs coughs	South Africa Kenya Kenya	Mander *et al.* 1997 Milner 1994 Milner 1994
TUBULIDENTATA **Orycteropidae** Aardvark	*Orycteropus afer*	teeth teeth claws fur back back toes blood feet unspecified unspecified unspecified unspecified unspecified	prevent bad luck prevent illness good harvest food poison backache prevent bad omens prevent polygamy stomachache unspecified good luck charm card playing charm unspecified unspecified unspecified	Malawi Malawi Mozambique Kenya South Africa South Africa South Africa Ethiopia Zimbabwe Botswana	Kingdon 1974 Kingdon 1974 Kingdon 1974 Kingdon 1974 Maliwichi 1996 Maliwichi 1996 Guissamulo 1996 Emerton 1991 Cunningham & Zondi 1991 Cunningham 1993a Cunningham 1993a Desalegn *et al.* 1996 Mukamuri 1996 Mbewe 1996
ARTIODACTYLA **Suidae** Warthog	*Phacochoerus africanus*	bone fat fat tusk tusk unspecified	measles wounds uterine prolapse unspecified convulsions unspecified	Ethiopia Ethiopia Ethiopia Zimbabwe Malawi Swaziland	Desalegn *et al.* 1996 Desalegn *et al.* 1996 Desalegn *et al.* 1996 Mukamuri 1996 Maliwichi 1996 Van Damme 1996
Eritrean Warthog	*Phacochoerus africanus aelani*	blood	pneumonia	Eritrea	Hagos *in litt.* 1997

Somali Warthog	*Phacochoerus aethiopicus delameri*	blood	pneumonia	Eritrea	Hagos *in litt.* 1997
Bushpig	*Potamochoerus* spp.	blood bone bone fat fat fat ulna	asthma chest ailments chase away demons coughs disease immunity unspecified diagnosing	Kenya Kenya Kenya Kenya Kenya Botswana Mozambique	Emerton 1991 Emerton 1991 Emerton 1991 Emerton 1991 Emerton 1991 Mbewe 1996 Guissamulo 1996
Hippopotamidae Common Hippo	*Hippopotamus amphibius*	rib fat fat unspecified unspecified	to protect home unspecified unspecified charm for cattle love charm	Kenya Mozambique Botswana South Africa South Africa	Simiyu *et al.* 1996 Guissamulo 1996 Mbewe 1996 Cunningham 1993a Cunningham 1993a
Giraffidae Giraffe	*Giraffa camelopardalis*	fat fat fat unspecified unspecified	love charm good fortune protective charm love charm protective charm	Namibia Namibia Namibia South Africa South Africa	Mander *et al.* 1996 Mander *et al.* 1996 Mander *et al.* 1996 Cunningham 1993a Cunningham 1993a
Bovidae Eland	*Tragelaphus oryx*	skin fat fat oil unspecified unspecified unspecified	unspecified treating babies charm for cattle deter evil spirits chest/ear problems hunting dog charm unspecified	Mozambique South Africa South Africa South Africa South Africa South Africa Namibia	Guissamulo 1996 Cunningham 1993a Cunningham 1993a Mander *et al.* 1997 Mander *et al.* 1997 Mander *et al.* 1997 Mander *et al.*.1996
Greater Kudu	*Tragelaphus strepsiceros*	horn meat	ascariasis ear disease	Ethiopia Ethiopia	Desalegn *et al.* 1996 Desalegn *et al.* 1996
Kudu	*Tragelaphus* spp.	unspecified	unspecified	Swaziland	Van Damme 1996
Buffalo	*Synceros caffer*	fat fat	attract mate good luck	Mozambique Mozambique	Guissamulo 1996 Guissamulo 1996
Impala	*Aepyceros melampus*	unspecified	unspecified	South Africa	Cunningham 1993a
Suni	*Neotragus moschatus*	unspecified	unspecified	South Africa	Cunningham 1993a
Reedbuck	*Redunca* spp.	unspecified	unspecified	South Africa	Cunningham 1993a
Cape Grysbok	*Raphicerus melanotis*	whole	decoration	South Africa	Mander *et al.* 1997
Blue Duiker	*Cephalophus monticola*	unspecified	unspecified	South Africa	Cunningham 1993a
Red Duiker	*Cephalophus natalensis*	unspecified	unspecified	South Africa	Cunningham 1993a
Duiker	unspecified	intestine skin skin horn horn meat ribs unspecified	stomachache stop thieves heart palpitations healer's hooters wounds tapeworms leprosy unspecified	Kenya Kenya Malawi Mozambique Ethiopia Ethiopia Ethiopia Swaziland	Emerton 1991 Emerton 1991 Maliwichi 1996 Guissamulo 1996 Desalegn *et al.* 1996 Desalegn *et al.* 1996 Desalegn *et al.* 1996 Van Damme 1996

Wildebeest	*Connochaetes taurinus*	unspecified tail	unspecified unspecified	Swaziland Tanzania	Van Damme 1996 Kahatano 1997
Klipspringer	*Oreotragus oreotragus*	skin unspecified unspecified	evil eye unspecified to treat babies	Ethiopia Zimbabwe South Africa	Desalegn *et al.* 1996 Mukamuri 1996 Cunningham 1993a
Oribi	*Ourebia ourebi*	bile	puff adder bites	Ethiopia	Desalegn *et al.* 1996
Antelope	unspecified	horn	unspecified	Ethiopia	Vigne & Martin 1993
Buck	unspecified	skin skin	coughs skin problems	Zimbabwe Zimbabwe	Mukamuri 1996 Mukamuri 1996
PHOLIDATA **Manidae** Cape Pangolin	*Manis temminckii*	unspecified all parts scales blood blood unspecified	unspecified unspecified heart conditions nosebleeds nosebleeds nosebleeds rheumatism cattle ailments good luck good luck good luck rain making rain making rain making rain making rain making warding off lions repel wild animals against bad omens spoons? heart problems against bullets expel placenta to position the foetus internal organs psycho-social ills love potion	Malawi Tanzania Namibia South Africa Tanzania Botswana South Africa Botswana Malawi Mozambique Tanzania Namibia Tanzania Zimbabwe Mozambique Malawi Uganda Tanzania Malawi Ethiopia Namibia Mozambique Tanzania Tanzania Namibia Namibia South Africa	Maliwichi 1996 Kingdon 1974 Kingdon 1974 Brautigam *et al.* 1994 Brautigam *et al.* 1994 Brautigam *et al.* 1994 Kingdon 1974 Brautigam *et al.* 1994 Maliwichi 1996 Brautigam *et al.* 1994 Kahatano 1997 Mander *et al.* 1996 Kingdon 1974 Mukamuri 1996 Brautigam *et al.* 1994 Maliwichi 1996 Brautigam *et al.* 1994 Kahatano 1997 Maliwichi 1996 Kingdon 1974 Mander *et al.* 1996 Guissamulo 1996 Kahatano 1997 Kahatano 1997 Kingdon 1974 Kingdon 1974 Kingdon 1974
Giant Pangolin	*Manis gigantea*	scales scales	neutralize evil spirits attract lovers	Uganda Uganda	Kingdon 1974 Kingdon 1974
RODENTIA **Hystricidae** South African Crested Porcupine	*Hystrix africae-australis*	meat spines spines unspecified unspecified	good luck measles unspecified body pains unspecified	Kenya Kenya Malawi South Africa Zimbabwe	Simiyu *et al.* 1996 Simiyu *et al.* 1996 Maliwichi Cunningham 1993a Mukamuri 1996
North African Crested Porcupine	*Hystrix cristata*	unspecified	unspecified	Somalia	Farah 1997
Thryonomyidae Cane Rat	*Thryonomys swinderianus*	unspecified unspecified unspecified	love charm good luck charm pregnancy treatment	South Africa South Africa South Africa	Cunningham 1993a Cunningham 1993a Cunningham 1993a
Sciuridae Red Squirrel	*Paraxerus palliatus*	whole	unspecified	South Africa	Mander *et al.* 1997

Family unspecified Rat	unspecified	meat meat tail intestine dung	marriage ceremonies chest problems make wife stay make wife stay inflamed navel cord	Kenya Kenya Kenya Kenya Zimbabwe	Emerton 1991 Emerton 1991 Emerton 1991 Emerton 1991 Gelfand *et al.* 1985
LAGOMORPHA **Leporidae** Hare	*Lepus* spp.	meat fur fur blood skin	skin swellings burns burns mental illness bad luck	Kenya Kenya Tanzania Ethiopia Malawi	Emerton 1991 Emerton 1991 Kahatano 1997 Desalegn *et al.* 1996 Maliwichi 1996
Rabbit	unspecified	meat urine skin tail	work promotion aphrodisiac angina unspecified	Kenya Zimbabwe Mozambique Mozambique	Simiyu *et al.* 1996 Gelfand *et al.* 1985 Guissamulo 1996 Guissamulo 1996
AVES **Struthioniformes** **Struthionidae** Ostrich	*Struthio camelus*	fat fat fat fat fat/flesh fat/flesh fat/eggs bone unspecified unspecified	allergies bone healing bone healing arthritis liver ailments heart ailments asthma sickle cell anemia unspecified asthma	Kenya Ethiopia Eritrea Sudan Somalia Somalia Ethiopia Uganda Mozambique Sudan	Simiyu *et al.* 1996 Desalegn *et al.* 1996 Hagos *in litt.* 1997 MAPRI 1997 Farah 1997 Farah 1997 Desalegn *et al.* 1996 Amai 1996 Guissamulo 1996 MAPRI 1997
CICONIIFORMES **Scopidae** Hamerkop	*Scopus umbreta*	unspecified	witchcraft	South Africa	Cunningham & Zondi 1991
FALCONIFORMES **Accipitridae** Vulture	unspecified	heart heart brain head legs feathers head/feet	divining unspecified unspecified fortune telling good luck charm unspecified unspecified	Zimbabwe Botswana Botswana Zimbabwe Zimbabwe Mozambique South Africa	Gelfand *et al.* 1985 Mbewe 1996 Mbewe 1996 Gelfand *et al.* 1985 Gelfand *et al.* 1985 Guissamulo 1996 Cunningham & Zondi 1991
Fish Eagle	*Haliaeetus vocifer*	dung unspecified unspecified unspecified	unspecified protective charm love charm skin treatment	Zimbabwe South Africa South Africa South Africa	Gelfand *et al.* 1985 Cunningham 1993a Cunningham 1993a Cunningham 1993a
Bataleur Eagle	*Terathopius ecaudatus*	unspecified unspecified	protective charm cause storms	South Africa South Africa	Cunningham 1993a Cunningham 1993a
Eagle	unspecified	whole egg femur	good luck increase milk prod. fortune telling	Kenya Ethiopia Ethiopia	Simiyu *et al.* 1996 Desalegn *et al.* 1996 Desalegn *et al.* 1996
GALLIFORMES **Numididae** Tufted Guineafowl	*Numidia meleagirs*	meat	bleeding after birth	Ethiopia	Desalegn *et al.* 1996
Guineafowl	unspecified	unspecified	unspecified	Mozambique	Guissamulo 1996
GRUIFORMES **Otididae** Kori Bustard	*Ardeotis kori*	unspecified	unspecified	Namibia	Mander *et al.* 1996

Bustard	unspecified	fat/flesh fat/flesh	liver ailments heart ailments	Somalia Somalia	Farah 1997 Farah 1997
COLUMBIFORMES **Columbidae** Dove	unspecified	nest nest heart	vertigo epilepsy love potion	Zimbabwe Zimbabwe Zimbabwe	Gelfand *et al.* 1985 Gelfand *et al.* 1985 Gelfand *et al.* 1985
STRIGIFORMES **Strigidae** Owl	unspecified	unspecified	witchcraft	South Africa	Cunningham & Zondi 1991
Caprimulgiformes **Caprimulgidae** Pennant-winged Nightjar	*Macrodipteryx vexillaria*	unspecified	coma	Malawi	Maliwichi 1996
CORACIIFORMES **Alcedinidae** Kingfisher	unspecified	dung	eye ailments	Zimbabwe	Gelfand *et al.* 1985
Bucerotidae Ground Hornbill	*Bucorvus abyssinicus*	unspecified unspecified bone	rain making protective charm wounds	South Africa South Africa Ethiopia	Cunningham & Zondi 1991 Cunningham 1993a Desalegn *et al.* 1996
Hornbill	*Bucorvus* spp.	meat	rabies	Sudan	MAPRI 1997
PICIFORMES **Indicatoridae** Honeyguide	unspecified	unspecified	unspecified	Zambia	Muswema & Mpengula 1996
Hirundinidae Swallow	unspecified	unspecified	running endurance	Zambia	Muswema & Mpengula 1996
PASSERIFORMES **Corvidae** Pied Crow	*Corvus albus*	heart bone dung whole	mental illness baldness unspecified cough	Ethiopia Ethiopia Ethiopia Ethiopia	Desalegn *et al.* 1996 Desalegn *et al.* 1996 Desalegn *et al.* 1996 Desalegn *et al.* 1996
Fan-tailed Raven	*Corvus rhipidurus*	blood	aphrodisiac	Ethiopia	Desalegn *et al.* 1996
Francolin	unspecified	meat	bleeding after birth	Ethiopia	Desalegn *et al.* 1996
Spheniscidae Jackass Penguin	*Spheniscus demersus*	unspecified	unspecified	South Africa	Cunningham 1993a
Crowned Plover	*Vanellus coronatus*	unspecified	unspecified	South Africa	Cunningham 1993a
Purple Breasted Lourie	*Tauraco corythaix*	unspecified	unspecified	South Africa	Cunningham 1993a
Prions	*Pachyptilia* sp.	unspecified	unspecified	South Africa	Cunningham 1993a
Cape Gannet	*Morus capensis*	unspecified	unspecified	South Africa	Cunningham 1993a
Hadada Ibis	*Hagedashia hagedash*	unspecified	unspecified	South Africa	Cunningham 1993a
Natal Robin	*Cossypha natalensis*	unspecified	unspecified	South Africa	Cunningham 1993a

REPTILIA **TESTUDINATA** **Chelonidae** Sea Turtle	unspecified	shell	convulsions	Tanzania	Clark & Khatib 1993
		shell	tetanus	Tanzania	Clark & Khatib 1993
		shell	asthma	Tanzania	Clark & Khatib 1993
		shell	aches	Tanzania	Clark & Khatib 1993
		shell	acne	Tanzania	Clark & Khatib 1993
		shell	fatigue	Tanzania	Clark & Khatib 1993
		shell	eczema	Tanzania	Clark & Khatib 1993
		shell	children resembling a turtle	Tanzania	Clark & Khatib 1993
		shell	anterior fontanelle in children	Malawi	Maliwichi 1996
		oil	anaemia	Tanzania	Clark & Khatib 1993
		oil	respiratory ailments	Tanzania	Clark & Khatib 1993
		oil	blood in urine	Tanzania	Clark & Khatib 1993
		oil	skin problems	Tanzania	Clark & Khatib 1993
		oil	sore muscles	Tanzania	Clark *et al.* 1993
		oil	hernia	Tanzania	Clark *et al.* 1993
		oil	earache	Tanzania	Clark *et al.* 1993
		oil	body swelling	Tanzania	Kahatano 1997
		oil	aphrodisiac	Somalia	Forbes pers. comm. 1997
		egg	anaemia	Tanzania	Clark & Khatib 1993
		egg	blood in urine	Tanzania	Clark & Khatib 1993
		egg	constipation	Tanzania	Clark & Khatib 1993
		egg	jaundice	Tanzania	Clark & Khatib 1993
		egg	eye problems	Tanzania	Clark & Khatib 1993
		egg	chest problems	Tanzania	Clark & Khatib 1993
		egg	stomach problems	Tanzania	Clark & Khatib 1993
		egg	sexual complaints	Mozambique	IUCN/UNEP 1996
		skin	aches	Eritrea	Hagos *in litt.* 1997
		skin	skin problems	Eritrea	Hagos *in litt.* 1997
		skin	blood in urine	Eritrea	Hagos *in litt.* 1997
		skin	epilepsy	Eritrea	Hagos *in litt.* 1997
		genitalia	aphrodisiac	Eritrea	Hagos *in litt.* 1997
		dung	poultry parasites	Madagascar	Rakotonirina & Cooke 1994
Green Turtle	*Chelonia mydas*	oil	many uses	Kenya	Gubelman & Kavu 1996
Testudinidae Leopard Tortoise	*Geochelone pardalis*	liver	coughs	Kenya	Simiyu *et al.* 1996
		whole	epilepsy	Namibia	Mander *et al.* 1996
		whole	magic	Namibia	Mander *et al.* 1996
		shell	unspecified	Malawi	Maliwichi 1996
		head	unspecified	Malawi	Maliwichi 1996
		legs	unspecified	Malawi	Maliwichi 1996
unspecified	unspecified	shell	nosebleeds	Zimbabwe	Mukamuri 1996
		shell	headaches	South Africa	Cunningham & Zondi 1991
		shell	witchcraft	South Africa	Cunningham & Zondi 1991
		shell	against bad omens	Malawi	Maliwichi 1996
		shell	haemorrhoids	Tanzania	Kahatano 1997
		legs	backache	Malawi	Maliwichi 1996
		head	cancer	Malawi	Maliwichi 1996
Hinged Tortoise	*Kinixys* spp.	unspecified	unspecified	Mozambique	Guissamulo 1996

CROCODYLIA **Crocodylidae** Nile Crocodile	*Crocodylus niloticus*	eggs unspecified unspecified unspecified unspecified skin scutes teeth teeth fat fat oil oil oil oil oil meat genitalia	to protect home stomach problems protective charm unspecified unspecified epilepsy diagnosing bravery bravery coughs unspecified wounds burns skin ulcers cancer asthma increase boldness aphrodisiac	Kenya South Africa South Africa Zambia Swaziland Mozambique Mozambique Mozambique Malawi Kenya Botswana Madagascar Madagascar Madagascar Madagascar Madagascar Ethiopia Sudan	Simiyu *et al.* 1996 Cunningham & Zondi 1991 Cunningham & Zondi 1991 Muswema & Mpengula 1996 Van Damme 1996 Guissamulo 1996 Guissamulo 1996 Guissamulo 1996 Maliwichi 1996 Simiyu *et al.* 1996 Mbewe 1996 Behra 1992 Behra 1992 Behra 1992 Behra 1992 Behra 1992 Desalegn *et al.* 1996 MAPRI 1997
SAURIA Lizard	unspecified	dung	prevent miscarriage	Uganda	Amai 1996
Agamidae Tree Agama	*Agama atricollis*	unspecified unspecified unspecified	love charm witchcraft ear infections	South Africa South Africa South Africa	Cunningham 1993a Cunningham 1993a Cunningham 1993a
Chamaeleonidae Chamaeleon	*Chameleo* sp.	unspecified	skin problems	South Africa	Cunningham & Zondi 1991
Drakensberg Dwarf Chameleon	*Bradypodion dracomontanum*	whole	preventative charm	South Africa	Mander *et al.* 1997
Zululand Dwarf Chameleon	*Bradypodion nemorale*	whole	preventative charm	South Africa	Mander *et al.* 1997
Black-headed Dwarf Chameleon	*Bradypodion melanocephalum*	whole	preventative charm	South Africa	Mander *et al.* 1997
Natal Midlands Dwarf Chameleon	*Bradypodion thamnobates*	whole	preventative charm	South Africa	Mander *et al.* 1997
Setaro's Dwarf Chameleon	*Bradypodion setaroi*	whole	preventative charm	South Africa	Mander *et al.* 1997
Cordylidae Giant Girdled Lizard	*Cordylus giganteus*	unspecified unspecified	protective charm love charm	South Africa South Africa	Cunningham & Zondi 1991 Cunningham & Zondi 1991
Jones' Girdled Lizard	*Cordylus tropidosternum jonesii*	whole	unspecified	South Africa	Mander *et al.* 1997
Warren's Girdled Lizard	*Cordylus warreni*	unspecified	maintain love of mate	Mozambique	Guissamulo 1996
Varanidae Nile Monitor Lizard	*Varanus niloticus*	fat claws whole/head unspecified unspecified unspecified unspecified	smallpox against bad luck rabies unspecified witchcraft ear problems skin problems	Kenya Malawi Ethiopia South Africa South Africa South Africa South Africa	Fratkin 1996 Maliwichi Desalegn *et al.* 1996 Williams *et al.* 1996 Cunningham 1993a Cunningham 1993a Cunningham 1993a
White-throated Monitor	*Varanus exanthematicus*	unspecified unspecified	unspecified unspecified	South Africa South Africa	Williams *et al.* 1996 Mander *et al.* 1997

SERPENTES **Pythonidae** African Rock Python	*Python sebae*	skin	regalia	Zimbabwe	Mukamuri 1996
		skin	diagnosing	Zimbabwe	Gelfand *et al.* 1985
		skin	leprosy	Zimbabwe	Gelfand *et al.* 1985
		skin	sexual diseases	Malawi	Maliwichi 1996
		skin	epilepsy	Mozambique	Guissamulo 1996
		skin	hearing problems	Zambia	Muswema & Mpengula 1996
		skin	regalia	Namibia	Mander *et al.* 1996
		fat	longevity	Zimbabwe	Mukamuri 1996
		fat	respect/prestige	Zimbabwe	Gelfand *et al.* 1985
		fat	love potion	Zimbabwe	Gelfand *et al.* 1985
		fat	ear pain	Mozambique	Guissamulo 1996
		fat	hearing problems	Zambia	Muswema & Mpengula 1996
		fat	unspecified	Botswana	Mbewe 1996
		fat	sores	Namibia	Mander *et al.* 1996
		backbone	backache	Zimbabwe	Gelfand *et al.* 1985
		backbone	backache	Malawi	Maliwichi 1996
		bone	backache	Mozambique	Guissamulo 1996
		bone	snakebite antidote	Namibia	Mander *et al.* 1996
		bone	unspecified	Zimbabwe	Mukamuri 1996
		unspecified	ear infections	Ethiopia	Desalegn *et al.* 1996
		unspecified	vomiting	Ethiopia	Desalegn *et al.* 1996
		unspecified	unspecified	South Africa	Williams *et al.* 1996
		unspecified	protective charm	South Africa	Cunningham 1993a
		unspecified	charm for cattle	South Africa	Cunningham 1993a
		unspecified	charm for crops	South Africa	Cunningham 1993a
		unspecified	good luck charm	South Africa	Cunningham 1993a
		unspecified	unspecified	Kenya	Simiyu *et al.* 1996
		unspecified	unspecified	Swaziland	Van Damme 1996
		dung	good luck charm	Namibia	Mander *et al.* 1996
		head	charm for cattle	Namibia	Mander *et al.* 1996
Colubridae Dusky-bellied Water Snake	*Lycodonomorphus laevissimus*	whole	unspecified	South Africa	Mander *et al.* 1997
Common Brown Water Snake	*Lycodonomorphus rufulus*	whole	unspecified	South Africa	Mander *et al.* 1997
Viperidae Puff Adder	*Bitis arietens*	backbone	backache	Zambia	Muswema & Mpengula 1996
		fat	ear ailments	Zambia	Muswema & Mpengula 1996
		unspecified	protective charm	South Africa	Cunningham 1993a
		unspecified	witchcraft	South Africa	Cunningham 1993a
Gaboon Viper	*Bitis gabonica*	unspecified	unspecified	South Africa	Cunningham 1993a
Elapidae Green Mamba	*Dendroaspis angusticeps*	head	snakebite	South Africa	Mander *et al.* 1997
Black Mamba	*Dendroaspis polylepis*	head	painful joints	Zimbabwe	Gelfand *et al.* 1985
		head	snakebite	Namibia	Mander *et al.* 1996
		tail	swollen joints	Zimbabwe	Gelfand *et al.* 1985
		unspecified	fits	Ethiopia	Desalegn *et al.* 1996
		unspecified	unspecified	Namibia	Mander *et al.* 1996
		unspecified	unspecified	South Africa	Williams *et al.* 1996
		unspecified	unspecified	South Africa	Cunningham 1993a
Forest Cobra	*Naja melanoleuca*	whole	witchcraft	South Africa	Mander *et al.* 1997
Mozambique Spitting Cobra	*Naja mossambica*	unspecified	to cause discord	South Africa	Cunningham 1993a
AMPHIBIA **Ranidae** Bullfrog	*Pyxicephalus adspersus*	unspecified	unspecified	South Africa	Cunningham 1993a

Bufonidae Amatola toad	*Bufo amatolicus*	unspecified	unspecified	South Africa	Mander *et al.* 1997
Heleophrynidae Cape Ghost Frog	*Heleophryne regis*	unspecified	unspecified	South Africa	Mander *et al.* 1997
ORDER? **Congridae** Conger Eel	*Conger cinereus*	unspecified	unspecified	Mozambique	Guissamulo 1996
Electric Eel	unspecified	unspecified unspecified	to stop witchcraft skin swelling	Zambia Zambia	Muswema & Mpengula 1996 Muswema & Mpengula 1996
Electric Fish	unspecified	unspecified unspecified	bravery protection from thugs	Zimbabwe Malawi	Gelfand *et al.* 1985 Maliwichi 1996
PISCES Longhorn Cowfish	? Check	unspecified	against spirits	Mozambique	Guissamulo 1996
Shortspine Porcupine Fish	? Check	unspecified unspecified	increase production bravery	Mozambique Malawi	Guissamulo 1996 Maliwichi 1996
Balloon Porcupinefish	*Diodon holocanthus*	unspecified	unspecified	South Africa	Cunningham 1993a
Circular Seabat	*Halieutaeae fitzsimonsi*	unspecified	unspecified	South Africa	Cunningham 1993a
Redbait	*Pyura stolonifera*	unspecified	charm for crops	South Africa	Cunningham 1993a
Pelican Flounder	*Chascanopsetta lugubris*	unspecified	unspecified	South Africa	Cunningham 1993a
Dogfish	*Squalus* sp.	unspecified	unspecified	South Africa	Cunningham 1993a
Deepwater Stingray	*Urotrygon daviesi*	unspecified	unspecified	South Africa	Cunningham 1993a
Fringelip Tonguefish	*Paraplagusia bilineata*	unspecified	unspecified	South Africa	Cunningham 1993a
Fringelip Flathead	*Thysanophrys otaitensis*	whole	unspecified	South Africa	Mander *et al.* 1997
Sole	Soleidae spp.	whole	charms	South Africa	Mander *et al.* 1997
INVERTEBRATA **ARACHNIDA** Scorpion	unspecified	unspecified	pneumonia	Zimbabwe	Gelfand *et al.* 1985
CRUSTACEA Crab/crayfish	unspecified	unspecified unspecified unspecified	witchcraft eye treatment strokes	South Africa South Africa South Africa	Cunningham 1993a Cunningham 1993a Cunningham 1993a
Banded Mantis Shrimp	*Harposquilla harpax*	unspecified	unspecified	South Africa	Cunningham 1993a
INSECTA Housefly	*Musca domestica*	whole	divination	Zimbabwe	Gelfand *et al.* 1985
Locust	*Locusta migratoria*	whole	rapid heartbeats	Zimbabwe	Gelfand *et al.* 1985
Blister Beetles	unspecified	unspecified	unspecified	Zimbabwe	Gelfand *et al.* 1985
ANTHOZOA Staghorn Coral	unspecified	unspecified	protection from theft	Mozambique	Guissamulo 1996

ASTEROIDEA Sea Star	unspecified	unspecified unspecified unspecified	good luck witchcraft STDs	Mozambique South Africa South Africa	Guissamulo 1996 Cunningham 1993a Cunningham 1993a
MOLLUSCA Frog Shell	*Bursa granularis*	unspecified	unspecified	South Africa	Cunningham 1993a
Black Chiton	*Orithochiton litteratus*	unspecified unspecified	witchcraft STDs	South Africa South Africa	Cunningham 1993a Cunningham 1993a
Tiger Cowrie	*Cypraea tigris*	unspecified unspecified	unspecified unspecified	Mozambique South Africa	Guissamulo 1996 Cunningham 1993a
Money Cowrie	*Cypraea moneta*	unspecified	unspecified	Mozambique	Guissamulo 1996
Arabic Cowrie	*Cypraea arabica*	unspecified unspecified	unspecified unspecified	Mozambique South Africa	Guissamulo 1996 Cunningham 1993a
Snake's Head Cowrie	*Cypraea caput-serpentes*	unspecified	unspecified	South Africa	Cunningham 1993a
Cowrie	*Cypraea vitellus*	unspecified	unspecified	South Africa	Cunningham 1993a
Cowrie	unspecified unspecified	unspecified shell	unspecified STDs	Zimbabwe Tanzania	Mukamuri 1996 Kahatano 1997
Textile Cone	*Conus textile*	unspecified	unspecified	South Africa	Cunningham 1993a
Triton	*Cymatium citrina*	unspecified	unspecified	South Africa	Cunningham 1993a
Triton	*Cymatium hepaticum*	unspecified	unspecified	South Africa	Cunningham 1993a
Triton	*Ranella olearium*	unspecified	unspecified	South Africa	Cunningham 1993a
Onion Shell	*Melapium lineatum*	unspecified	unspecified	South Africa	Cunningham 1993a
Olive Shell	*Oliva carolinia*	unspecified	unspecified	South Africa	Cunningham 1993a
Toothed Topshell	*Monodonta australis*	unspecified	unspecified	South Africa	Cunningham 1993a
Pink-lipped Topshell	*Oxystele sinensis*	unspecified	unspecified	South Africa	Cunningham 1993a
Seashell	unspecified	unspecified	bountiful harvests	Zimbabwe	Gelfand *et al.* 1985
Snail	unspecified	shell shell shell shell unspecified	expel demons unspecified difficult childbirth protection from theft ulcers	Kenya Zimbabwe Uganda Malawi Zimbabwe	Simiyu *et al.* 1996 Mukamuri 1996 Amai 1996 Maliwichi 1996 Gelfand *et al.* 1985
Cuttlefish	*Sepia* spp.	unspecified unspecified	unspecified eye treatment	Botswana South Africa	Mbewe 1996 Cunningham 1993a
Octopus	unspecified	unspecified	love charm	South Africa	Cunningham 1993a
ECHINOIDEA Sea Urchin	unspecified	unspecified	stomach problems	South Africa	Cunningham 1993a

Source: Milledge, 1997.

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