Market profiles and trade in medicinal plants in the Lowveld, South Africa

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SUMMARY

Rising demand for medicinal plants has led to increased pressure on wild plant populations. This, combined with shrinking habitats, means that many species in South Africa are now facing local extinction. In 1997, a study was initiated to determine the extent of trade in medicinal plants in the South African Lowveld (the low lying plains to the east of the Drakensberg escarpment), and to investigate socio-economic factors influencing trade and resource management. Trade was not as extensive in the Lowveld as in major urban markets such as Durban or the Witwatersrand (Johannesburg and surrounding towns), either in terms of the quantity, number or range of species sold, or the numbers of people relying on the trade for an income. In markets assessed in Mpumalanga Province, 176 species were identified (71% of the vernacular names encountered in the market place), representing 69 plant families. In Limpopo, 70 different species were identified (84% of the vernacular names encountered in the market place), representing 40 families. Imports were significant in Mpumalanga (33% of the plants on offer), mainly from Mozambique. A detrended correspondence analysis showed substantial differences between species traded in Mpumalanga and those sold in Limpopo. There was little variation in the species stocked by vendors in Mpumalanga, regardless of the season, the attributes of the seller, or whether business was carried out in urban or rural areas. In contrast, there was considerable variation in the stock inventories of the Limpopo traders. Despite the lower levels of local trade, increased harvesting pressure is being experienced regionally, to meet demand in metropolitan centres such as the Witwatersrand. This study showed considerable local variation and complexities in the harvesting and marketing of medicinal plants, with both a national and an international dimension. This dual spatial scale presents both opportunities and challenges in the management of these plants, which need to be addressed simultaneously, particularly with respect to research requirements and development of predictive models and capacity. Cooperation in conservation strategies and policies is required at regional, national and international levels, while ensuring that management initiatives take into account local market conditions and the socio-economic realities facing both consumers and those who depend on the trade for their livelihoods.

Keywords: community-based conservation, Kruger National Park, subsistence, sustainable livelihoods, traditional healers

INTRODUCTION

Unprocessed medicinal plants play a vital role in the health of people in developing countries, where the World Health Organization estimates that 70–80% of the populations use traditional medicine (Olsen 1998). This also applies to South Africa, where traditional medicine is considered complementary to western medicine (Cunningham 1992). As subsistence-sector consumers are distanced from harvesting areas through rising urbanization, there has been an increase in trade at local, regional and international levels (Marshall 1998). The rural poor are major stakeholders in the medicinal plant trade, particularly women and sectors of the community with limited alternative income generating opportunities (Cunningham 1991; Mander 1998).

As with many informal markets (Veeman 2002), volumes sold are difficult to quantify because of a lack of records and the often illicit nature of trade. However, Mander (1998) estimated in 1996 that approximately 20 000 tonnes of medicinal plants were consumed in South Africa annually, valued at approximately R 270 million (≈US$ 60 million at the time of the study). This is 39% higher than the quantity of plants exported by Germany, ranked third highest exporter of pharmaceutical plants globally (Lange 1997). The bulk of plants traded in South African medicinal markets is harvested from wild populations which, combined with increased pressure on habitats, has resulted in numerous local extinctions (Cunningham 1992; Mander 1998; Botha 2001).

Most South African conservation agencies have now initiated community-based conservation (CBC) programmes with traditional healers and, more recently, those involved in trade. Pilot projects were started with traditional healers living on the western border of the Kruger National Park (KNP) in 1994. A major problem facing traditional healers was the legal acquisition of wildlife products needed for traditional medicine. Both conservation officials and traditional healers were concerned about the potential local extinction of wild

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populations of medicinal species outside protected areas, where high levels of harvesting were occurring (Botha 1998).

After conducting problem analyses, the traditional healers developed a programme with relevant stakeholders incorporating: (1) cultivation of medicinal plants in home gardens; (2) the establishment of a nursery; (3) accessing medicinal plants on sites earmarked for development; (4) training initiatives, including primary health care, AIDS/HIV training, business management, horticulture and permaculture; and (5) improved cooperation between traditional healers and western medical practitioners in local clinics and hospitals. Attempts were made to synergize the activities of regional conservation agencies, private forestry, non-governmental organizations (NGOs) and the Departments of Agriculture, Health and Social Welfare, and Water Affairs, and Forestry.

At the time, little was known about the medicinal plant resource base in this region. Market surveys are an efficient means of acquiring data on local values and the conservation status of indigenous species (Martin 1995). Previous research into the South African medicinal plant industry focused on metropolitan markets in KwaZulu-Natal (Cunningham 1992; Mander 1998) and Gauteng Province (Williams et al. 2000). However, markets are influenced by a variety of factors, including socio-economic, cultural and environmental conditions, transport systems, state policy and international influences. An understanding of market profiles, socio-economic attributes influencing trade, species traded and the impact of trade on plant populations is critical for effective resource management.

Local-level studies often provide important data that complement regional or national studies (Kumar & Jain 2002). For example, district-level research on medicinal and aromatic plant trade from Nepal to India showed that the trade may be more extensive than originally estimated through regional studies (Olsen & Helles 1997). Furthermore, plants valued in local or regional herbal preparations may differ from those that reach international markets, with many of the former having restricted local importance because of their traditional use, ready availability, low or absent cost and ease of preparation (Ibarra-Manriquez et al. 1997). This poses challenges for resource management as, for example, species with restricted local value may be intensively exploited, but may be overlooked during the development of resource management strategies as higher profile species are targeted.

Our study was initiated to assess the extent of trade in medicinal plants on the KNP border and to investigate socio-economic factors influencing trade and resource management. The four key questions are: (1) What is the extent of trade in medicinal plants in the region? (2) How do the profiles of markets compare with those elsewhere? (3) Do the numbers and flow of species traded vary between markets? (4) How could this impact on the development of CBC programmes? Botha et al. (2001) provide an inventory of the species traded, and Botha (2001) and Botha et al. (2002, 2003, 2004) report the socio-economic profiles of those involved in the trade, factors influencing prices of products and the impact of commercial harvesting on selected species.

METHODS

Study area

The KNP is situated in the Lowveld (low altitude) in the north-east of South Africa, and is bordered by Zimbabwe in the north and Mozambique in the east. The 360 km long KNP falls within the Limpopo and Mpumalanga Provinces (Fig. 1). Rainfall is concentrated in the hot summer months (October–May). Winters are temperate and, apart from some low-lying areas, frost is rare.

The people of the Lowveld are culturally diverse. People living adjacent to the north-western border of the KNP are mainly Tsonga, while those living near the town of Phalaborwa are mainly Pedi. The majority of residents of Hazyview and Mkhuhlu are Tsonga or Swazi, and those from Nsikazi are Swazi. Thohoyandou and Sibasa are home to the Venda people.

Income generating opportunities within the region are limited. In 1996, 33% and 41% of the population between 15 and 65 years had no fixed income in Mpumalanga and Limpopo, respectively (Statistics South Africa 1998). Of those who were employed, 35% and 41% earned ≤R 500 per month in Mpumalanga and Limpopo, respectively (≈US$ 115 per month in 1996; Statistics South Africa 1998). Levels of formal education are also limited. In 1996, 45% of those living
in Mpumalanga and 49% of the Limpopo population over 20 years of age had received no formal education, or had attended only a limited number of years at primary school level (Statistics South Africa 1998).

Market surveys

We obtained permission to conduct the study through local and regional leadership structures and during mass meetings in the villages. We reported back the results of this study, as well as the additional projects described in the Introduction, to participants on an individual basis and/or through meetings.

We conducted a regional overview in June–July 1997 to identify markets and make contact with market operators. The overview incorporated major urban areas believed to form part of the market ‘catchments’ of the medicinal plant trade on the KNP border, based on discussions with traditional healers and KNP staff. These included Thohoyandou, Sibasa, Giyani, Malamulele, Louis Trichardt and Phalaborwa in Limpopo, and Hazzyview and Nelspruit in Mpumalanga (Fig. 1). Bushbuckridge was excluded, as research was in progress (Mander 1997). Detailed surveys were then conducted on a sub-sector of the markets occurring in the regions included in the KNP Traditional Healers Programme, namely, Thohoyandou, Sibasa, Giyani, Malamulele and Nelspruit, Hazzyview and the Nsikazi district.

The study focused on trade conducted within the informal sector, in which operators traded on pavements in urban areas or at pension markets, as well as plants sold in shops specializing in the sale of traditional medicines (known as ikhemisi [sing.] in Swazi). Plants traded by direct mail order companies and organizations with pharmaceutical interests were excluded. People trading within the informal economy are referred to as ‘vendors’, while those operating from fixed premises are termed ‘traders’. Detailed surveys were conducted with all those who were willing to be interviewed: 73% of the vendors trading on the streets of Nelspruit and 70% of those selling at pension markets in the Nsikazi district (the former are termed ‘street vendors’ and the latter ‘pension day vendors’). Pension markets have evolved throughout South Africa at the locations where the Department of Social Services pays pensions along a predefined mobile route. A wide variety of products are traded, including clothing, food, household consumables and traditional medicines. The market usually remains in place for several hours, and then moves on to the next pay point. In Limpopo, detailed surveys were conducted with four traders: three of the five traders then operating in Thohoyandou and Sibasa, and one based in Malamulele. A total of 29 detailed surveys were carried out over 54 visits. This included 16 summer, two spring and 11 winter surveys. The full interview schedule is available in Botha (2001).

We took an inventory of the plants displayed on stands. Plants were weighed and prices recorded. We conducted semi-structured interviews to obtain additional socio-economic data. Plants were identified by accompanying vendors on harvesting trips, through concurrent research on the cultivation of plants in the home gardens of traditional healers participating in the KNP Traditional Healers’ Programme and by growing out bulbs. When plants could not be identified directly, vernacular names were identified through regional herbaria and medicinal plant nurseries, or lists of plant names compiled by other researchers were consulted.

To avoid potential breach of intellectual property, or the creation of the perception that programmes were being implemented in exchange for local knowledge, the uses of plants were not recorded.

We performed correlation and $\chi^2$ tests to test for relationships between attributes in the markets or species traded, using Systat 7.0. To statistically assess the pattern and range of species being traded, a detrended correspondence analysis (DCA) was performed on the different species stocked by each vendor or trader, using CANOCO Version 4.0 (ter Braack 1988).

RESULTS

Number of markets and vendors

Trading of medicinal plants in the informal sector was limited in Limpopo (Table 1), occurring mainly at taxi ranks. No medicinal plants were traded in villages adjacent to the KNP in Limpopo, but five traders were operating in the regional urban centres of Thohoyandou and Sibasa (Table 1), and one in Phalaborwa; the remainder were general dealers who stocked medicinal products obtained from wholesalers.

There was greater informal sector activity in Mpumalanga, where vendors operated mainly near taxi ranks and at pension markets. Gatherers (who supply vendors and traders, rather than selling to the public themselves) from outside the area occasionally sold products they had bought or collected locally, regionally (Mpumalanga or Limpopo), in other provinces (mainly KwaZulu-Natal) or countries (mainly Swaziland). Approximately 23 pension day vendors sold medicinal plants regularly, while 8–10 street vendors traded near the Nelspruit taxi ranks (Table 1).

Only one trader specialized in traditional medicine in the Mpumalanga study area, although a pharmacy in White River and a general dealer in Nelspruit carried pre-packed plant products obtained from wholesalers based on the Witwatersrand (Johannesburg and surrounding towns in Gauteng Province) and Durban (KwaZulu-Natal).

Plants traded

Dried plant products were sold individually and in mixtures in both regions to traditional healers as well as to the public. Mixtures consisted of chopped roots and bark, or products were ground into powders or administered in solutions. Chopped root and bark mixtures were generally provided on
Table 1  Summary of the numbers of traders, street and pension day vendors operating in urban areas within the trading ‘catchment’.  Sources: 1 Statistics South Africa (1991); 2 Bushbuckridge Town Council (personal communication 2000); 3 Hazyview Town Council (personal communication 2000); 4 Louis Trichardt Town Council (personal communication 2000); 5 Nelspruit City Council (personal communication 2000); 6 Phalaborwa Town Council (personal communication 2000); 7 Thohoyandou Town Council (personal communication 2000); 8 White River Town Council (personal communication 2000).  ∗ Included in population of Thohoyandou.

<table>
<thead>
<tr>
<th>Province</th>
<th>Urban area</th>
<th>Distance from KNP (km)</th>
<th>Population (municipal area)</th>
<th>Number of vendors</th>
<th>Number of traders (owners or managers)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Men</td>
<td>Women</td>
</tr>
<tr>
<td>Limpopo</td>
<td>Malamulele</td>
<td>55</td>
<td>179 000</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Giyani</td>
<td>80</td>
<td>211 000</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Thohoyandou</td>
<td>64</td>
<td>500 000</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Sibasa</td>
<td>68</td>
<td>_</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Louis Trichardt</td>
<td>129</td>
<td>120 000</td>
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<td>2</td>
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<tr>
<td></td>
<td>Phalaborwa</td>
<td>4</td>
<td>11 032</td>
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<td>1</td>
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<tr>
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<td>Lilekane</td>
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<td>16 734</td>
<td>1</td>
<td>1</td>
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<tr>
<td></td>
<td>Namakgale</td>
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<td>57 839</td>
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<td>1</td>
</tr>
<tr>
<td>Mpumalanga</td>
<td>Mkhuulu</td>
<td>20</td>
<td>372 637</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Hazyview</td>
<td>48</td>
<td>40 000</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Nelspruit</td>
<td>39</td>
<td>235 434</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>White River</td>
<td>32</td>
<td>38 639</td>
<td>12</td>
<td>1</td>
</tr>
</tbody>
</table>

Demand in Limpopo, rather than being prepared in advance and displayed on stands as they were in Mpumalanga.

The majority of medicinal products traded were derived from trees (Fig. 2). Similar percentages of roots were on display in the Mpumalanga and Limpopo markets (59.4% and 60.5%, respectively), with 23.0% of the stock consisting of bark in Mpumalanga and 6.2% in Limpopo. Only 8.0% and 3.5% of the total number of species traded in Mpumalanga and Limpopo, respectively, were geophytes. The differences in proportions of life forms ($\chi^2 = 87.11; df = 6; p < 0.001$) and plant parts ($\chi^2 = 86.7; df = 3; p < 0.001$) were significant, with higher proportions of bulbs and bark in the Mpumalanga markets.

In Mpumalanga, 176 species were identified (71% of the vernacular names encountered in the market place), representing 69 families. In Limpopo, 70 different species were identified (84% of the vernacular names encountered in the market place), representing 40 families. The number of species on display during one interview varied from 17–92, with a mean of 27 ± 3 (SE) plant species for individual pension day vendors. Between 14 and 65 medicinal plants (27 ± 10) were on offer at trading outlets in Limpopo. However, the latter figure includes 27 parasites (*thahame* or *nzunzu* in Venda). As Venda, Zulu and Swazi people classify parasites according to the host tree on which they are found, rather than the parasite itself (for example, *nzunzu ya*, host species), it was difficult to confirm the identity of individual species being traded.

The species traded in Mpumalanga differed substantially from those sold in Limpopo (Fig. 3). The position of each vendor or trader on the DCA plot is determined by the composition of species they each stocked, with the Mpumalanga vendors being clumped together on the principal

Figure 2 (a) Life forms and (b) proportions of plant parts traded in Mpumalanga and Limpopo. Leaves, stems, branches, seeds, flowers and fruit (potentially less damaging to the plant when harvested) were pooled, while the category ‘Whole plants’ includes parasites.
Figure 3 Detrended correspondence analysis (DCA) of species stocked by Limpopo traders (black diamonds), and a trader and street and pension day vendors in Mpumalanga (grey squares).

axis, and the Limpopo traders scattered along the second axis. There was also little variation in the species stocked in Mpumalanga with respect to the season, attributes of the seller (for example, trader, street or pension day vendor, gender or age), or whether business was carried out in urban or rural areas. In contrast, there was considerable variation in the stock inventories between the Limpopo traders. There was a large variety of species traded in the two markets. The gradient lengths of the axes showed considerable difference in the plant inventories between the Limpopo traders and the street and pension day vendors in Mpumalanga (Table 2).

The DCA showed little difference in the species traded between men and women. In the informal sector of Mpumalanga, only women sold Boweia volubilis (igibisila), while only men sold Callilepis laureola (impilane), Cassytha filiformes (imphikayiboni) and rooistroom (possibly Bulbine alooides). However, a female trader in Mpumalanga also stocked Callilepis laureola and Cassytha filiformes. While only three of the 38 species occurring on the stands of a husband and wife pair trading from separate stands in Nelspruit were the same, between them they stocked the same range of plants as the other Mpumalanga vendors.

Plants were seldom discarded in either project area and there was little wastage. Although vendors said that demand for species such as Adenium multiflorum or A. swazicum (ununankhulu) was higher if the plant was fresh, dried products were kept for long periods of time. A Limpopo trader mentioned that the power of certain plants is enhanced as the products age.

Source of plant material
All the vendors and traders bought certain plant products from gatherers, distant markets and, particularly in the case of the vendors, each other, although the ratio of collected to bought products varied (Fig. 4). In Mpumalanga, there was a negative correlation between income earned through the medicinal trade and the ratio of plants collected to those bought, with those earning higher incomes buying all or most of their products ($r_S = -0.68; df = 14; p < 0.005$). Unlike the Mpumalanga trader who bought all her stock, the Limpopo traders collected a proportion of their plants. It was not possible to explore a statistical correlation between the incomes of the traders and the proportion of plants collected or bought in Limpopo as only one respondent was prepared to disclose his earnings.

There was a significant difference in the proportions of plants sourced from different regions in the two study areas ($\chi^2 = 20.957; p < 0.005; df = 3$; Fig. 5). ‘Local’ refers to plants obtained from sites within a 50 km radius of the markets, while ‘regional’ includes Mpumalanga and Limpopo. ‘Imported’ plants originated outside South Africa. Of the 33% of plants imported into the Mpumalanga markets, 14% were obtained from Swaziland and 85% from Mozambique, with one record from Malawi. Of the 3% of plants reported to be available in KwaZulu-Natal by the Mpumalanga vendors and trader, 1.7% were also derived from Swaziland. In Limpopo, 70% of the plants on display were obtained regionally. Of the 10% of stock that was imported, 56% came from Botswana and 44% from Zimbabwe.

Flow of products
The Nelspruit street vendors supplied buyers from Gauteng, but demand varied. In a good month, one woman sold

Table 2 Summary statistics of the detrended correspondence analysis of species stocked by vendors in the Limpopo Province and Mpumalanga markets.

<table>
<thead>
<tr>
<th>Axes</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eigenvalue</td>
<td>0.882</td>
<td>0.649</td>
<td>0.449</td>
</tr>
<tr>
<td>Length of gradient</td>
<td>9.838</td>
<td>6.257</td>
<td>4.089</td>
</tr>
<tr>
<td>Cumulative percentage variance of species data</td>
<td>10.5</td>
<td>18.2</td>
<td>23.5</td>
</tr>
<tr>
<td>Sum of all unconstrained eigenvalues</td>
<td>8.43</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
approximately one 25 kg bag per week, with a 12 kg bag being sold every 2–4 weeks during a poor month. The Limpopo traders also traded products when on buying or collecting trips. Occasionally, traders from KwaZulu-Natal and Gauteng travelled to Thohoyandou to purchase plants. It was difficult to quantify these transactions but, overall, quantities exported by the traders, street and pension day vendors interviewed appeared relatively low.

**DISCUSSION**

Four aspects of this study are pertinent to the design and implementation of CBC programmes relating to plant use and commercialization: (1) the extent of trade, (2) regional differentiation of markets, (3) importation patterns, and (4) the nature of plant parts traded. In comparison to the metropolitan areas of South Africa, the markets along the KNP border are small and fragmented, similar to rural areas in the Eastern Cape (Cocks et al. 2004). Fewer than 30 vendors were encountered in this study, compared with 400–500 vendors in Durban (Mander 1998) and 166 traders on the Witwatersrand (Williams et al. 2000). Conservation efforts should thus be easier to implement, at lower costs. However, these initiatives have the potential to impact a far wider range of resource users, given the extensive networks and social capital that exist within and between markets.

It is challenging to include gatherers, as they are often elusive, infrequent visitors to markets. The number of gatherers involved in medicinal plant trade is considerably lower in the Lowveld than in KwaZulu-Natal, where 7000–8000 gatherers are estimated to supply the Durban markets (Mander 1998). In Central Nepal, 3700 gatherers from the Gorkha district collected plants to supply the trade to India (Olsen 1998). Given the limited resources available to conservation agencies, and the restricted levels of work carried out with user groups within the region to date, it is suggested that programmes should initially be implemented with traditional healers, vendors, traders and communities on whose land popular species are being harvested, whilst concurrently exploring ways of integrating gatherers.

Differences were found in the species composition between markets, with the number and range of species, as well as the proportions of different life forms, varying significantly. The number of species recorded in Mpumalanga was higher (176 species) than in the Limpopo markets included in this study (70 species) (Botha et al. 2001) and in Bushbuckridge, where 120 species were regularly traded (Mander 1997). The Mpumalanga markets are situated at a geographical crossroads between Limpopo, Durban, the Witwatersrand, Swaziland and Mozambique. Similar numbers of species were recorded in the trade from Central Nepal to India (100 species; Olsen 1998) and the City of Toluca, one of the largest markets in Central Mexico (about 69 medicinal species; Ugent 2000), while at local, weekly markets in India, 30 plant species were commonly traded, only seven of which were used medicinally (Kumar & Jain 2002). In contrast, over 420 species were recorded in Durban (Cunningham 1992) and 511 species on the Witwatersrand (Williams et al. 2000). These markets support growing urban populations, with high ethnic diversity in the latter that possibly stimulates demand for a larger number of species (Williams et al. 2000).

Only 9% of the species traded in Mpumalanga were recorded in Limpopo. Only 20% and 16% of the plants identified in Mpumalanga and Limpopo, respectively, were included on a list of the most important plants traded in Bushbuckridge, about 40 km away (Mander 1997). While 55% of the species identified in Mpumalanga were traded in Durban (Cunningham 1992), only 16% of the former occurred on a list of the 70 most important medicinal species identified by Durban traders (Mander 1998). Similarly, 51% of the species traded in Mpumalanga and 41% of those in Limpopo were recorded on the Witwatersrand, despite the greater number of species traded in the latter markets (Williams et al. 2001). This variety in regional consumer preferences helps spread the impact of harvesting over a range of species, apart from the most popular ones. However, it also poses challenges. It is crucial to conduct research into local socio-economic conditions and identify locally important species when developing management strategies.

Different importation patterns were noted. In Mpumalanga, many species were reported to be available from different areas, helping to spread the harvesting impact over a large area. A broader distribution range should also increase the overall chances of survival of a species, particularly...
in view of other pressures such as habitat fragmentation. However, harvesters travel long distances to obtain resources (Fig. 6). A higher proportion of plants was imported into Mpumalanga from neighbouring countries (33%), compared with Limpopo (10%) and Gauteng (7%) (Williams et al. 2000). The majority of the Mpumalanga imports were from Mozambique (85%), with 14% from Swaziland. Although the Lowveld vendors and traders were not exporting large volumes at the time of the study, conservation officials report regular illegal export of medicinal species, often collected by residents on commission for Gauteng traders or imported by Mozambicans entering South Africa illegally (G. Strydom, personal communication 2000). The highest proportion of medicinal plants traded on the Witwatersrand came from KwaZulu-Natal (42%), with 7% from Limpopo, 3% from Mpumalanga and 0.02% from Mozambique (Williams et al. 2000). It is possible that importation may involve more than one stage and that some material imported into Mpumalanga from Mozambique could be sold again to metropolitan traders, but the origin of the material is ascribed to the intermediate source locality rather than the original source. As KwaZulu-Natal plant populations become depleted, harvesting in the Lowveld is likely to increase.

The harvesting of fruits, flowers and leaves is potentially less destructive than that of roots and bark from trees, or geophytes where the whole plant is removed (Cunningham 1992; Shackleton 2001). In the Lowveld, the greatest proportions of plant parts were roots, bark or the whole plant, with relatively small proportions of flowers, fruit, seeds and branches. This, in conjunction with the high degree of commercialization and increasing numbers of gatherers, means that current methods of harvesting will not be sustainable in the long term in the absence of stronger local and national institutional controls (Crook & Clapp 1998; Neumann & Hirsch 2000).

Legislation has done little to curb the medicinal trade historically (Dauskardt 1991). In South Africa, a plethora of legislation exists pertaining to the conservation of indigenous plants, but enforcement is difficult. As is common throughout Africa (Marshall 1998), the Mpumalanga vendors displayed limited awareness of legislation relating to the harvesting of plants. In Limpopo, awareness and enforcement levels were higher, but people who had been fined appeared to view this as an occupational hazard rather than a deterrent (Botha 2001). With increasing unemployment more people are returning to rural areas to seek a living based on rural resources (Shackleton et al. 2001), and a greater awareness of resource management and relevant legislation is required. Education programmes need to be cast more widely rather than targeted just at traditional healers.

CBC interventions have had limited effect to date, often due to the localized scale of initiatives. A more coordinated effort in terms of both geographical and sectoral boundaries is needed, given the magnitude of the trade, capitalizing on the extensive networks and social capital already in existence. Linkages need to be formed between CBC initiatives across the sub-region, including relevant conservation, agriculture and forestry departments, as well as between counterparts from neighbouring countries. Partnerships need to be established between resource users and the public and private sectors in bulk ing up propagation material, setting up distribution mechanisms, funding and training. Partnerships forged between the conservation and the health sector were valuable in the KNP Traditional Healers Programme, as traditional medicine is a holistic modality, and people’s identities,
well-being and culture are closely associated with land and biodiversity.

Harvesting pressures of popular species could be alleviated if substitutes were available. Traditional medicines are, however, highly species specific because of the characteristics of the species, their symbolism or the form in which they are taken (Hutchings 1989). Corresponding to similar observations in KwaZulu-Natal (Cunningham 1991), only six substitutes were identified in the Lowveld. Although less acceptable species may be adopted if the original becomes unavailable, this may only occur once populations have declined to such low levels that it is no longer financially viable to harvest them, as in the woodcraft industry of Kenya (Choge 2001).

Domestication and cultivation have been mooted as a key strategy in meeting demand for medicinal plants (Netsilulvhi 1999; Bass et al. 2001). Although certain cultural constraints need to be considered, Lowveld resource users were willing to cultivate medicinal plants. However, mass cultivation is required if the national demand for medicinal plants is to be met without erosion of biodiversity. Increasing scarcity will lower the relative opportunity costs of cultivation, making it a more attractive option (Crook & Clapp 1998), but interventions must concurrently focus on promoting a regional approach to encourage the sustainable use of wild populations. The development of harvesting mechanisms has to include issues of land and resource tenure (Neumann et al. 2004). Unlike Nepal, where communities were homogenous, had strong access rights and were able to control outside collectors (Olsen 1998), local institutions and customary resource management systems in many parts of southern and East Africa are being eroded, resulting in deterioration or loss of resources (Letsela et al. 2002; Luoga et al. 2004).

There is considerable local variation and complexity in the harvesting and marketing of medicinal plants, requiring local-level management interventions. Simultaneously, the harvesting of these plants has a national and international dimension that necessitates regional cooperation in management strategies and policies. This dual spatial scale poses both opportunities and challenges to medicinal plant conservation, and one cannot be addressed in isolation of the other, especially with respect to research requirements and the development of predictive models and capacity.

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