

The trade in medicinal plants in the Eastern Cape Province, South Africa

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A study of the trade in medicinal plants in the Eastern Cape Province of South Africa undertook to document the species traded, to determine the quantities harvested annually, and to assess the economic value of the trade. All the participants involved at the different levels of the trade were included in the survey, that is, informal street hawkers, owners of *amayeza esiXhosa* stores, traditional healers, and consumers of traditional medicines. In total, 282 questionnaires were administered in six urban centres. It was found that poorly educated black middle-aged women of low economic standing dominate the trade. A minimum of 166 medicinal plant species were traded at the study sites alone, providing 525 tonnes of plant material valued at approximately R27 million annually. Plants were harvested from a diverse range of vegetation types including Valley Thicket, Afromontane Forest, Coastal Forest and Moist Upland Grassland, the most frequently sold species differing significantly from those documented in similar studies in other regions. The Forest Biome was the vegetation type found to be most threatened by over-harvesting. Of the species documented, 93% were being harvested unsustainably and 34 species have been prioritised for conservation management.

Background

The trade in traditional medicines forms part of a multi-million rand 'hidden economy' in southern Africa¹ stimulated by high population growth, rapid urbanization, unemployment, and the high cultural value of traditional medicines. Demand generates a species-specific trade network that can extend across national boundaries.¹ Consequently, the trade in traditional medicines is now greater than at any time in the past and is certainly the most complex resource management issue facing conservation agencies, healthcare professionals and resource users in South Africa today.¹ Mander² estimated that there are 27 million indigenous medicine consumers in South Africa with a large supporting industry. The use and trade of plants for medicine is therefore no longer confined to traditional healers but has entered both the informal and formal entrepreneurial sectors of the South African economy,^{3,4-8} resulting in an increase in number of herbal gatherers and traders.

Demand for plant-derived medicines has created a trade in indigenous plants in South Africa currently estimated to be worth approximately R270 million a year.^{2,9} More than 700 plant species are known to be actively traded for medicinal purposes throughout the country and intensive harvesting of wild material is acknowledged as a serious threat to biodiversity in the region. Increasing harvesting pressures on traditional supply areas are linked to a growing shortage in supply of popular medicinal plant species.^{2,7,9-16} Demand for certain taxa exceeds

supply, with traders reporting acute shortages and price increases. Several plant species have been so greatly exploited that they are seldom found in unprotected areas. The harvesting and trade of plant (and animal) material from wild populations for medicinal purposes has been, and remains, controversial, particularly with regard to biodiversity conservation.^{2,10,18-20}

To date, most documentation of the trade in medicinal plants has been undertaken in the KwaZulu-Natal,^{4,2} Gauteng,^{7,12,13} and Mpumalanga^{4,21} provinces of South Africa, providing valuable baseline information for each. A regional overview of the trade in plant and animal species is presented by Marshall.²² The use and trade of medicinal plants is not, however, confined to these three provinces.

The Eastern Cape Province, home to 15.5% (6.3 million) of South Africa's total population (40.6 million in 1996), incorporates two of the former 'homelands' of the apartheid period (i.e. Ciskei and Transkei), where many aspects of traditional culture are still part of everyday life. Of the Eastern Cape population, 86% is African, 37% is urbanized, 49% is unemployed (with 31% of those employed earning less than R500 a month), and 41% of the households live in traditional dwellings.²³ The people of the Eastern Cape tend to be more traditional and rural, but also significantly poorer and less developed, than those in other parts of South Africa.²⁴ A large proportion of the province's population is reliant to some extent on natural resources for direct subsistence use or, indirectly, for generating income.^{8,25,26,27,28,29} A rapidly growing population coupled with increasing poverty and urbanization has a compound impact on the province's resource base.

Holdstock³⁰ estimates that up to 80% of the African people in South Africa use traditional medicines and Mander² reports that there are more than 100 000 practising traditional healers in the country, with a contingent industry worth about R500 million per annum. The low socio-economic standing of the large, predominantly rural Eastern Cape population suggests that the great majority use traditional methods of health care.³¹ With a medical doctor to total population ratio in South Africa of 1:17 400 reported by Pretorius *et al.*,³² there is no doubt that traditional medicine plays an important role in the nation's health care system. It has been found, furthermore, that the use of traditional medicine is not confined to rural, low income groups but is often a basic requirement for treating certain conditions irrespective of education and income levels.^{8,22,33} Indeed, the little that is known of the trade in the Eastern Cape points to a vibrant and sizeable trade, with contingent demands on the natural resource base.^{8,15-17,33,34} Williams *et al.*¹⁴ reported that some material traded in Gauteng markets originates from the Eastern Cape, thus revealing that the trade in medicinal plants is not only local but also inter-provincial.

Methods

The shift to a cash economy and the emergence of commercial harvesters in what was largely a specialist activity restricted to traditional healers have resulted in medicinal plants becoming a common property resource with few incentives for resource

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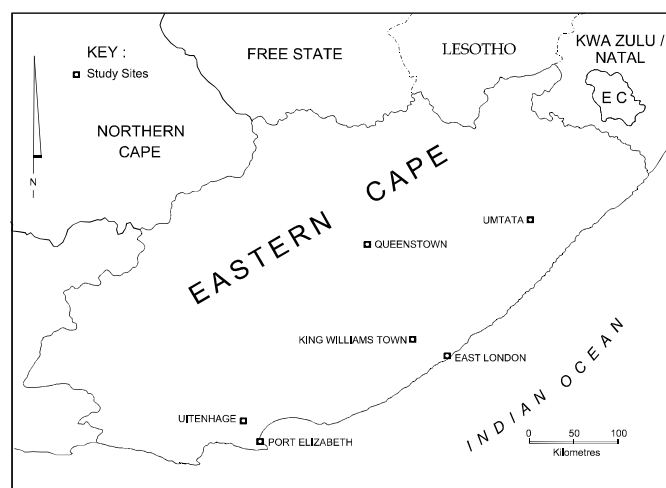


Fig. 1. Map of the Eastern Cape Province showing the study sites.

management or traditional conservation practice. Cocks³³ and Mander² have identified four key stakeholder groups in the medicinal plant trade: informal gatherer-hawkers, traditional healers, owners of *amayeza esiXhosa* stores (equivalent to the more widely known *muthi* stores found in KwaZulu-Natal), and consumers of traditional medicines. The marketing of medicinal plants in the study area is largely informal, dominated by simple technologies and interactions, and driven primarily by economics. This enables a wide range of community members to engage in various aspects of the trade. The survey was conducted in the following four trading complexes in the Eastern Cape Province: Port Elizabeth/Uitenhage (pop. 538 700), East London/King William's Town (pop. 206 000), Umtata (pop. 255 800) and Queenstown (pop. 53 160) (Fig. 1).

A sample of between 80% and 100% of the street hawkers and storeowners was undertaken in each centre. Traditional healers were also interviewed at their practices, but the total number of healers within the study sites is unknown and their proportional representation cannot be determined. A random survey of 138 patients at six municipal clinics was undertaken to assess the level of traditional medicinal plant use (following Mander²). Stakeholder-specific questionnaires were designed to determine which medicinal plants are in high demand, the frequency of sale of these preferred species, the quantities sold, and the cost of the products. A total of 282 respondents were interviewed, resulting in 1204 entries of traded plants. Table 1 provides the number of respondents for each stakeholder group and includes the clinic patient survey.

A standard method for estimating quantities traded was devised whereby plant material was classified into plant parts (bark, bulbs, stems and whole plants) and each plant part was assigned to one of three mass categories (high, medium or low). Traders indicated the quantity of each item harvested per month and its source. These quantities were often given in terms of the

Table 1. Total number of respondents from each stakeholder group.

City centre	Street traders	Traditional healers	Store owners	Clinic patients	Total
King William's Town	14	9	4	20	47
East London	9	18	4	25	56
Port Elizabeth	21	11	3	30	65
Uitenhage	4	9	3	20	36
Umtata	9	13	2	20	44
Queenstown	0	9	2	23	34
Total	57	69	18	138	282

container or carrier bag used by the informant for transporting the harvested material. Plant material was weighed and the average mass for each combination of container type and mass category was calculated. Traders also estimated the quantities of each product sold daily. The mass per traded item was calculated and the price recorded. In addition, recordings were made of the estimated average period each trader took to sell their entire holdings of each plant species before having to renew their stock.

These data were used to estimate total quantities of medicinal plant material gathered and sold annually in the study area. To identify fragmentary, often unrecognizable, plant material traded in the markets, specimen collecting trips were made to gather both specimens and specimen-related data during the last six years, resulting in the approximately 300 voucher specimens housed in the Selmar Schonland Herbarium in the Albany Museum, Grahamstown.^{16,17,28,35-38} The use of vernacular names to identify taxa was found to be unreliable as they vary considerably from place to place and even between traders within the same market. Specimen collecting trips were undertaken with collectors and healers in each vegetation type from which medicinal plants are known to be harvested. Twelve harvesting localities were visited and over 220 taxa positively identified and vouchered. Collectors and healers willing to participate in these collecting trips were identified during the market survey, informed that the data would be published, and offered compensation for their input. The data from the questionnaires were collated into a spreadsheet of 1204 entries and statistical analyses were completed using *Statistica*[®].

The plants traded

The study documented a total of 166 species traded for medicinal and cultural use in the study area. This figure, however, includes only those species listed in the top 10 most frequently sold species of each of the informants interviewed. The total number is therefore significantly higher. The 60 most frequently traded species the Eastern Cape are listed in Table 2. The top ranked species in the Eastern Cape differ significantly from those reported in surveys undertaken in Mpumalanga,⁷ KwaZulu-Natal² and Gauteng¹⁴ (Table 3). The discrepancies can be attributed to differences in healing practices between various ethnic groups as well as the plant species available in different biogeographical regions.

This comparison highlights the importance of local surveys in assessing conservation priorities and management strategies at a regional level. Marshall,²² for example, prioritises 25 plant species reported as scarce, heavily traded or with a high monetary value in South Africa, of which only 56% have been recorded in this survey. Although many of the plant species documented in this paper are required for traditional customs and rituals rather than for medicinal purposes in the strict sense, they are generally included by most authors as medicinal plants (in the broad sense). We have not distinguished between symbolic, cultural or psychosomatic uses, as the primary concern is to record taxa traded and their conservation status.

With regard to comparative studies, it has been pointed out that some Xhosa plant names do not correspond to the plant species known by the same, or similar, Zulu names (A. Cunningham, pers. comm.). It is important to realize that these discrepancies are not erroneous but are due to regional ethnic differences and highlight the importance of voucher specimens for correct plant identifications. Medicinal uses of the plant species documented here are not provided but may be obtained by referring to relevant literature.^{8,16,17,28,34,35,38-40}

Table 2. The 60 most frequently traded plants in order of frequency*.

No.	Frequency	Botanical name, vernacular name and voucher specimen number	Vegetation type and part used	Mean price per kg (95% confid. interval)	Mean quantity traded per trader (95% confid.interval) (kg/yr)
1.	98	<i>Hypoxis hemerocallidea</i> Fisch. & C.A. Mey. Inongwe, Ilabatheka Dold 4000	Grassland Rhizome	R29.30 <i>n</i> = 56 (22.3; 36.2)	123.0 kg <i>n</i> = 85(92.0; 153.7)
2.	50	<i>Ilex mitis</i> (L.) Radlk. Isidumo, Ubhubhubhu, Umkwenkwe Dold 4027	Forest Bark	R41.00 <i>n</i> = 21(26.0; 52.1)	117.6 kg <i>n</i> = 45(75.8; 146.6)
3.	47	<i>Rhoicissus digitata</i> (L. f.) Gilg & Brandt Uchithibhunga Dold 1717	Forest & Valley Thicket Tuber	R11.30 <i>n</i> = 32 (7.3; 15.05)	139.0 kg <i>n</i> = 47(102.2; 175.8)
		<i>Rhoicissus tridentata</i> (L. f.) Wild & R.B. Drum. subsp. <i>tridentata</i> Uchithibhunga Dold 1764	Forest & Valley Thicket Tuber		
4.	37	<i>Rubia petiolaris</i> DC. Impendulo, Ubulawu Dold 1831	Valley Thicket Root	R68.20 <i>n</i> = 12 (40.4; 95.9)	72.4 kg <i>n</i> = 34 (41.2; 103.7)
5.	36	<i>Helichrysum odoratissimum</i> (L.) Sweet Impepho Dold 3991, 4004	Grassland Leaf & stem	R26.60 <i>n</i> = 23 (18.2; 34.9)	64.7 kg <i>n</i> = 34 (16.2; 113.2)
6.	35	<i>Curtisia dentata</i> (Burm. f.) C.A. Sm. Umlaheni Dold 1819, 4038	Forest Bark	R59.00 <i>n</i> = 19 (26.7; 78.0)	66.5 kg <i>n</i> = 35 (29.0; 99.2)
7.	33	<i>Protorhus longifolia</i> (Bernh.) Engl. Uzintlwa Dold 1751	Forest Bark	R32.00 <i>n</i> = 19 (18.2; 39.6)	94.7 kg <i>n</i> = 29 (70.4; 117.0)
8.	33	<i>Bulbine latifolia</i> (L.f.) Roem. & Schult. Irooiwater Dold 1509, 3974; Cocks 18	Valley Thicket Rhizome	R30.80 <i>n</i> = 20 (20.4; 41.1)	98.7 kg <i>n</i> = 32 (52.6; 144.8)
9.	32	<i>Gasteria bicolor</i> Haw. var. <i>bicolor</i> Intelezi Dold 1517, 1697	Valley Thicket Whole plant	R52.00 <i>n</i> = 17 (19.8; 84.1)	112.0 kg <i>n</i> = 30 (54.2; 170.6)
		<i>Haworthia attenuata</i> Haw. Intelezi Dold 3989	Valley Thicket Whole plant		
10.	32	<i>Rapanea melanophloeos</i> (L.) Mez Umaphipha Dold 3969	Forest Bark	R37.30 <i>n</i> = 17 (22.3; 52.2)	62.3 kg <i>n</i> = 32 (48.6; 76.0)
11.	29	<i>Polygala serpentaria</i> Eckl. & Zeyh. Inceba Dold 1832	Valley Thicket Root	R41.10 <i>n</i> = 11 (20.4; 61.8)	53.7 kg <i>n</i> = 27 (39.7; 67.8)
12.	27	<i>Strychnos henningsii</i> Gilg Umnonono Dold 3967	Forest Bark	R56.90 <i>n</i> = 8 (34.4; 79.3)	65.0 kg <i>n</i> = 27 (43.4; 86.5)
		<i>Strychnos decussata</i> (Pappe) Gilg Umnonono Dold 1752	Forest Bark		
13.	26	<i>Cissampelos capensis</i> L. f. Idabulitye, Umayisake Dold 1712	Valley Thicket Bark	R105.00 <i>n</i> = 12 (44.4; 165.4)	66.2 kg <i>n</i> = 26 (49.7; 82.7)
14.	25	<i>Rhoicissus tomentosa</i> (Lam.) Wild & R.B. Drumm. Impinda bamshaye Dold 1749, 4028	Forest Tuber	R23.20 <i>n</i> = 8 (15.9; 30.3)	47.3 kg <i>n</i> = 24 (18.2; 76.5)
15.	25	<i>Dioscorea sylvatica</i> (Kunth) Eckl. Ufudo, Usikolipati Cocks 5	Forest Tuber	R14.90 <i>n</i> = 14 (6.0; 23.7)	151.3 kg <i>n</i> = 20 (106; 196.5)
16.	25	<i>Drimia elata</i> Jacq. Umredeni Dold 1704	Grassland Bulb	R27.30 <i>n</i> = 12 (16.0; 38.4)	113.9 kg <i>n</i> = 24 (90; 137.9)
17.	25	<i>Asparagus africanus</i> (Lam.) Oberm. Umathinga Cocks 3	Valley Thicket Rhizome	R31.60 <i>n</i> = 17 (19.1; 43.9)	141.0 kg <i>n</i> = 24 (87.9; 194.0)
		<i>Haemanthus albiflos</i> Jacq. Umathinga Dold 3973	Valley Thicket Bulb		
18.	25	<i>Dianthus thunbergii</i> Hooper Inkomoyentaba, Ungcana Dold 1810, 3997	Grassland Root	R35.10 <i>n</i> = 10 (10.4; 59.8)	66.9 kg <i>n</i> = 13 (58.9; 74.8)
19.	19	<i>Alepidea amatymbica</i> Eckl. & Zeyh. var. <i>amatymbica</i> Inkathazo, Iqwili Cocks 100	Grassland Root	R82.40 <i>n</i> = 7 (22.3; 142.4)	69.4 kg <i>n</i> = 18 (38.6; 100.1)

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Table 2 (continued)

No.	Frequency	Botanical name, vernacular name and voucher specimen number	Vegetation type and part used	Mean price per kg (95% confid. interval)	Mean quantity traded per trader (95% confid.interval) (kg/yr)
20.	17	<i>Gunnera perpensa</i> L. Iphuzi Dold 1808	Wetlands Root	R47.80 <i>n</i> = 11 (34.5; 60.9)	115.6 kg <i>n</i> = 17 (42.4; 188.8)
21.	17	<i>Bulbine abyssinica</i> A. Rich. Uyakayakana Cocks 21, Dold 1510	Valley Thicket Whole plant	R20.30 <i>n</i> = 8 (10.2; 30.3)	58.0 kg <i>n</i> = 15 (22.9; 93.1)
22.	15	<i>Hydnora africana</i> Thunb. Umavumbuka Cocks 101	Valley Thicket Whole plant	R28.80 <i>n</i> = 10 (18.2; 39.3)	134.8 kg <i>n</i> = 14 (88.7; 180.9)
		Sarcophyte sanguinea Sparrm. Umavumbuka Cocks 97	Valley Thicket Whole plant		
23.	15	<i>Boophone disticha</i> (L. f.) Herb. Ishwadi Dold 3988, 4011, 4048	Grassland Bulb	R17.20 <i>n</i> = 7 (6.6; 27.8)	111.4 kg <i>n</i> = 15 (67.1; 155.7)
24.	15	<i>Behnia reticulata</i> (Thunb.) Dirr. Isilawu Dold 1756	Forest Root	R66.40 <i>n</i> = 6 (29.2; 103.5)	78.5 kg <i>n</i> = 15 (36.4; 120.4)
		<i>Helinus integrifolius</i> (Lam.) Kuntze Isilawu Dold 1760, 3994	Forest & Valley Thicket Root		
25.	14	<i>Ranunculus multifidus</i> Forssk. Ujojo, Umvuthuza Dold 4043	Wetland Root	R59.10 <i>n</i> = 3 (-28.8; 147.1)	75.0 kg <i>n</i> = 11 (34.7; 116.5)
26.	14	<i>Albuca setosa</i> Jacq. Inqwebeba Cocks 98	Valley Thicket Bulb	R32.40 <i>n</i> = 10 (7.3; 57.4)	74.5 kg <i>n</i> = 14 (45.1; 104)
27.	14	<i>Dracaena alectrifomis</i> (Haw.) Bos Umayime Dold 4031	Forest Root	R17.80 <i>n</i> = 2 (-32.0; 67.6)	116.6 kg <i>n</i> = 13 (19.7; 213.6)
28.	14	<i>Pelargonium reniforme</i> Curtis Intololwana Dold 3986	Grassland Rhizome	R25.20 <i>n</i> = 6 (8.4; 41.9)	48.0 kg <i>n</i> = 8 (14.9; 81)
29.	14	<i>Clausena anisata</i> (Willd.) Hook. f. ex Benth. Iperepes, Isifutho, Isiqhumiso Dold 1689	Forest & Valley Thicket Leaves	R81.90 <i>n</i> = 6 (10.2; 153.6)	51.5 kg <i>n</i> = 12 (27.9; 75.0)
30.	13	<i>Sansevieria hyacinthoides</i> (L.) Druce. Isikolokotho Dold 4061	Valley Thicket Leaves	R30.40 <i>n</i> = 7 (10.6; 50.1)	25.5 kg <i>n</i> = 12 (12.6; 38.1)
31.	13	<i>Clematis brachiata</i> Thunb. Ityholo Dold 1894, 1821	Forest & Valley Thicket Leaves	R72.30 <i>n</i> = 3 (-202; 347)	47.5 kg <i>n</i> = 12 (47.5; 14.8)
32.	13	<i>Pentanisia prunelloides</i> (Klotzsch ex Eckl. & Zeyh.) Walp. var. <i>prunelloides</i> Icimamilo Dold 4010	Grassland Root	R60.00 <i>n</i> = 9 (11.6; 108.3)	74.3 kg <i>n</i> = 13 (9.7; 138.8)
33.	12	<i>Bersama lucens</i> (Hochst.) Szyszyl. Isindiyandiya Dold 1272, 1907	Forest Bark	R47.10 <i>n</i> = 4 (-14.1; 108.2)	65.4 kg <i>n</i> = 11 (38.6; 92.2)
34.	12	<i>Dolichos falciformis</i> E. Mey. Uvuma Dold 4008	Grassland Root	R44.60 <i>n</i> = 5 (-6.9; 96.1)	175.9 kg <i>n</i> = 12 (36.8; 315)
35.	12	<i>Diospyros villosa</i> (L.) de Winter Inyamyempunzi Dold 1914	Forest & Valley Thicket Root	R44.60 <i>n</i> = 5 (-6.9; 96.1)	175.9 kg <i>n</i> = 7 (36.8; 315)
36.	11	<i>Tulbaghia alliacea</i> L.f. Umwelela Dold 1554	Grassland Rhizome	R83.50 <i>n</i> = 7 (10.2; 56.6)	92.5 kg <i>n</i> = 11 (56.4; 128.5)
37.	11	<i>Cassipourea flanaganii</i> (Schinz) Alston. Ummemezi Dold 1743, 3966	Forest Bark	R51.70 <i>n</i> = 7 (36.7; 66.7)	84.0 kg <i>n</i> = 9 (57.4; 110.5)
38.	11	<i>Brachylaena ilicifolia</i> (Lam.) Phill. & Schweick. Umqeaba Dold 1504, 4052	Valley Thicket Leaves	R41.30 <i>n</i> = 6 (-2.9; 85.6)	49.8 kg <i>n</i> = 10 (6.0; 93.5)
39.	11	<i>Talinum caffrum</i> (Thunb.) Eckl. & Zeyh. Uphuncuka bempethe Dold 1675	Valley Thicket Rhizome	R18.00 <i>n</i> = 5 (7.5; 28.3)	131.6 kg <i>n</i> = 10 (50.7; 212.4)
40.	10	<i>Bowiea volubilis</i> Harv. ex Hook. F. Umagaqana Dold 2467	Forest & Valley Thicket Bulb	R29.00 <i>n</i> = 3 (-7.7; 65.8)	77.0 kg <i>n</i> = 9 (46.6; 107.6)

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Table 2 (continued)

No.	Frequency	Botanical name, vernacular name and voucher specimen number	Vegetation type and part used	Mean price per kg (95% confid. interval)	Mean quantity traded per trader (95% confid.interval) (kg/yr)
41.	9	<i>Ipomoea crassipes</i> Hook. Ubhoqo Dold 3995	Grassland Tuber	R21.50 <i>n</i> = 5 (–21.6; 64.7)	196.0 kg <i>n</i> = 9 (52.8; 339.1)
		<i>Ipomoea crispa</i> (Thunb.) Hallier f. Ubhoqo Dold 4002	Grassland Tuber		
42.	9	<i>Cyrtorchis arcuata</i> (Lindl.) Schltr. Iphamba Dold 1747	Forest Pseudobulb	R38.10 <i>n</i> = 6 (17.6; 58.4)	106.6 kg <i>n</i> = 9 (37.8; 175.5)
		<i>Polystachya pubescens</i> Reichb. f. Iphamba Dold 1746	Forest Whole plant		
		<i>Eulophia streptopetala</i> Lindl. Iphamba Dold 1836	Grassland Root		
43.	9	<i>Hippobromus pauciflorus</i> (L. f.) Radlk. Ulatile, Umfazonengxolo Dold 1677, 1834	Forest & Valley Thicket Bark	R44.30 <i>n</i> = 6 (1.2; 87.4)	78.7 kg <i>n</i> = 8 (37.0; 120.4)
44.	8	<i>Scabiosa columbaria</i> L. Isilawu, Iyeza lamahlo Dold 4003	Grassland Root	Not known	125.4 kg <i>n</i> = 7 (–69.6; 320.4)
		<i>Tritonia lineata</i> (Salisb.) Ker-Gawl. Isilawu esibomvu Dold 4013	Grassland Corm		
45.	8	<i>Asparagus suaveolens</i> (Burch.) Oberm. Imvane, Inqatha, Isilawu esimhlope Dold 3984, 4015	Valley Thicket Whole plant	Not known	78.0 kg <i>n</i> = 6 (–3.95; 159.9)
46.	8	<i>Trichilia dregeana</i> Sond. Isibara, Umkhuhlu Dold 4033	Forest Bark	R71.30 <i>n</i> = 2 (–611.7; 754.2)	69.9 kg <i>n</i> = 6 (11.9; 27.4)
47.	8	<i>Kedrostis foetidissima</i> (Jacq.) Cogn. Utvishe Dold 1710, 1681	Valley Thicket Tuber	R29.30 <i>n</i> = 4 (–28.8; 87.4)	105.2 kg <i>n</i> = 7 (38.4; 172.1)
48.	8	<i>Gnidia capitata</i> L.f. Isidikili, Umsilawengwe Dold 3972	Grassland Root & stem	R68.10 <i>n</i> = 4 (12.5; 123.6)	147.1 kg <i>n</i> = 6 (–148.3; 442.6)
49.	7	<i>Vernonia mespilifolia</i> Less. Ulunguhlungu Dold 1759	Forest & Valley Thicket Whole plant	R22.60 <i>n</i> = 4 (–23; 45.3)	134.5 kg <i>n</i> = 7 (–57.8; 327.0)
50.	6	<i>Elephantorrhiza elephantina</i> (Burch.) Skeels Gwejobomvu, Intolwane Dold 4089, 4112	Grassland Root	R30.80 <i>n</i> = 2 (–106.7; 168.4)	108.8 kg <i>n</i> = 6 (21.4; 196.2)
51.	6	<i>Pachycarpus concolor</i> E.Mey. Itshongwe Dold 2966	Grassland Root	R28.70 <i>n</i> = 3 (–44.4; 101.8)	375.0 kg <i>n</i> = 5 (–63.0; 811.0)
		<i>Xysmalobium orbiculare</i> (E.Mey.) D. Dietr. Itshongwe Dold 4001	Grassland Root		
		<i>Xysmalobium undulatum</i> (L.) W.T. Aiton Itshongwe Dold 2219	Grassland Root		
52.	6	<i>Ledebouria</i> sp. Isithithibala Cocks 22	Grassland Bulb	R23.30 <i>n</i> = 3 (–14.6; 61.2)	31.6 kg <i>n</i> = 5 (2.7; 60.4)
53.	6	<i>Capparis sepiaria</i> L. Intsihlo ombomvu Dold 1721	Valley Thicket Bark	R80.00 <i>n</i> = 1	102.0 kg <i>n</i> = 4 (–44.6; 248.6)
54.	5	<i>Xysmalobium</i> sp. Intsema Dold 4001	Grassland Root	Not known	63.6 kg <i>n</i> = 5 (3.1; 124.0)
		<i>Euphorbia clava</i> Jacq. Intsema Dold 4045	Valley Thicket Whole plant		
55.	5	<i>Senecio coronatus</i> (Thunb.) Harv. Iyeza lamasi Dold 1694, 1809	Forest & Valley Thicket Root	R53.70 <i>n</i> = 5 (13.2; 94.2)	13.2 kg <i>n</i> = 4 (0.6; 25.8)
		<i>Gerbera viridifolia</i> (DC.) Sch. Bip. Iyeza lamasi Dold 4005	Grassland Root		
		<i>Nidorella</i> sp. Iyeza lamasi Dold 1691	Grassland Root		

Continued on p. 594

Table 2 (continued)

No.	Fre- quency	Botanical name, vernacular name and voucher specimen number	Vegetation type and part used	Mean price per kg (95% confid. interval)	Mean quantity traded per trader (95% confid.interval) (kg/yr)
56.	3	<i>Hypoxis</i> sp. c.f. <i>filifolia</i> Ikhubalo likathikoloshe Cocks 99	Grassland Rhizome	Not known	38.6 kg <i>n</i> = 3 (16.2; 61.0)
57.	3	<i>Ocotea bullata</i> (Burch.) Baill. Umnukane Dold 4040	Forest Bark	R60.00 <i>n</i> = 1	54.0 kg <i>n</i> = 3 (-43.4; 151.4)
58.	3	<i>Eucomis comosa</i> (Houtt.) Wehrh. subsp. <i>comosa</i> Umphompo Dold 1278	Forest Bulb	R11.10 <i>n</i> = 1	21.3 kg <i>n</i> = 3 (-24.6; 67.2)
59.	2	<i>Pteronia incana</i> (Burm.) DC. Ibhosisi Dold 4170	Grassland Leaves	R40.00 <i>n</i> = 1	18.0 kg <i>n</i> = 2
60.	2	<i>Rumex steudellii</i> Hochst. ex A. Rich. Idololenkonyane Dold 4080	Grassland Root	R18.20 <i>n</i> = 1	51.0 kg <i>n</i> = 2 (-63.3; 165.3)

*Frequency refers to the number of respondents from each stakeholder group who listed the plant species amongst their top 10 most commonly sold plant species.

Table 3. Comparison of the 10 most frequently sold plant species in the Eastern Cape, Mpumalanga and KwaZulu-Natal.

No.	Eastern Cape ¹⁵	Mpumalanga ⁷	KwaZulu-Natal ²
1	<i>Hypoxis hemerocallidea</i>	<i>Alepidea amatymbica</i>	<i>Scilla natalensis</i>
2	<i>Ilex mitis</i>	<i>Warburgia salutaris</i>	<i>Alepidea amatymbica</i>
3	<i>Rhoicissus digitata</i>	<i>Acridocarpus natalitius</i>	<i>Ocotea bullata</i>
4	<i>Rubia petiolaris</i>	<i>Siphonochilus aethiopicus</i>	<i>Warburgia salutaris</i>
5	<i>Helichrysum odoratissimum</i>	<i>Acacia xanthophloea</i>	<i>Eucomis autumnalis</i> (sensu lato?)
6	<i>Curtisia dentata</i>	<i>Terminalia sericea</i>	<i>Curtisia dentata</i>
7	<i>Protorhus longifolia</i>	<i>Bersama tysoniana</i>	<i>Haworthia limifolia</i>
8	<i>Bulbine latifolia</i>	<i>Maesa lanceolata</i>	<i>Bowiea volubilis</i>
9	<i>Haworthia attenuata</i> & <i>Gasteria bicolor</i>	<i>Cephalaria humilis</i>	<i>Siphonochilus aethiopicus</i>
10	<i>Rapanea melanophloeos</i>	<i>Turraea floribunda</i>	<i>Secamone gerrardii</i>

Market values

The population of the six urban centres surveyed in the study area is 1 054 000,⁴¹ 70% of whom visit a traditional healer an average of three times a year.^{2,42} The number of traditional healers at the study sites is unknown; however the average mass of medicinal plant material dispensed per person at each visit to a traditional healer is estimated to be 216 g (ref. 2). The total mass of medicinal plant material dispensed by traditional healers at the study sites is therefore calculated to be approximately 478 tonnes per annum.

A 90% sample of informal gatherers/hawkers (*n* = 57) at the study sites revealed that each person traded an average of 569 kg of plant material annually, while a 90% sample of *amayeza* stores (*n* = 18) revealed that an average of 583 kg of plant material was traded by each store annually. The total annual amount traded by all (100%) informal gatherers/hawkers and *amayeza* stores at the study sites is therefore calculated as 35.8 tonnes and 11.6 tonnes, respectively.

Based on these data, it has been established that approximately 525 tonnes of plant material, valued at approximately R27 million, is traded at the study sites annually. These figures are based on data collected from the six urban centres within the study area alone; they are therefore only a conservative indication of what is being traded in every city, town, village and informal settlement across the province.

Of the top 10 most frequently sold plant species, the greatest quantity for a single species was that of *Hypoxis hemerocallidea* (11 000 kg/yr, valued at R322 500) followed by *Rhoicissus digitata* (6500 kg/yr, valued at R75 200), *Ilex mitis* (5300 kg/yr, valued at

R210 500), *Haworthia attenuata* & *Gasteria bicolor* (two species undifferentiated in the trade and, together, 3400 kg/yr, valued at R226 800), *Bulbine latifolia* (3200 kg/yr, valued at R98 600), *Protorhus longifolia* (2700 kg/yr, valued at R72 600), *Curtisia dentata* (2300 kg/yr, valued at R170 600), *Helichrysum odoratissimum* (2200 kg/yr, valued at R149 500), *Rubia petiolaris* (2100 kg/yr, valued at R89 500), and *Rapanea melanophloeos* (2000 kg/yr, valued at R92 000).

The market values of individual taxa vary considerably. Of the 10 most frequently sold species, the most expensive is *Rubia petiolaris*, with a mean price per kg of R68, followed by *Curtisia dentata* (R59/kg), *Haworthia attenuata* & *Gasteria bicolor* (R52/kg), *Ilex mitis* (R41/kg), *Rapanea melanophloeos* (R37/kg), *Protorhus longifolia* (R32/kg), *Bulbine latifolia* (R31/kg), *Hypoxis hemerocallidea* (R30/kg), *Helichrysum odoratissimum* (R27/kg), and *Rhoicissus digitata* (R11/kg).

Life forms

Of the 60 most frequently traded plant species, 63% comprised bulbs, tubers and roots that are removed entirely from the ground and the vegetative parts discarded; 17% comprised woody species that have bark removed, resulting in mortality when ring-barked; 13% comprised whole plants; and 7% comprised vegetative parts only. All plants are harvested from wild sources only and as yet no attempts have been made to cultivate medicinal plants in this province. Following Struhsaker's⁴³ definition of the term 'sustainable', it can be concluded that 93% of the species traded are harvested unsustainably, as they are either entirely or partially removed, resulting in the death of the plant.

Table 4. Reported conservation status of plant species that are harvested unsustainably and traded in large quantities at the study sites, are known to be rare or uncommon in the wild and/or are near-endemic, endemic or localized within the Eastern Cape Province.

Taxon	Status
<i>Alepidea amatymbica</i>	Scarce, heavily traded or with a high price in South Africa ²² Lower risk; near threatened ⁵⁶
<i>Boophone disticha</i>	Scarce, heavily traded or with a high price in South Africa ²² Protected ⁵⁷
<i>Bowiea volubilis</i>	Scarce, heavily traded or with a high price in South Africa ²² Vulnerable ⁵⁶
<i>Bulbine latifolia</i>	Heavily traded & unsustainably harvested at the study sites (as reported in this study) (Erroneously cited as <i>B. alooides</i> by Dold & Cocks ¹⁶ , corrected by S. Ramdhani, pers. comm.)
<i>Cassipourea flanaganii</i>	East Cape near-endemic (following GRA herbarium practice) Rare ⁵⁸ Threatened ⁴⁹
<i>Curtisia dentata</i>	Scarce, heavily traded or with a high price in South Africa ²² Lower risk; conservation dependent ⁵⁶ Vulnerable & declining ⁴⁵ Heavily traded, unsustainably harvested & with a high price at the study sites ¹⁶
<i>Cyrtorchis arcuata</i>	Protected ⁵⁷
<i>Dioscorea sylvatica</i>	Scarce, heavily traded or with a high price in South Africa ²² Lower risk – near threatened ⁵⁶ Protected ⁵⁷ Vulnerable & declining ⁴⁵
<i>Diospyros villosa</i>	Protected ⁵⁸
<i>Dracaena alectrifomis</i>	Scarce, heavily traded or with a high price in South Africa ²²
<i>Drimia elata</i>	Scarce, heavily traded or with a high price in South Africa ²²
<i>Elephantorrhiza elephantina</i>	Rare ⁵⁸
<i>Eucomis comosa</i>	Uncertain ⁵⁸
<i>Eulophia streptopetala</i>	Protected ⁵⁷
<i>Euphorbia clava</i>	East Cape endemic (following GRA herbarium practice) Unsustainably harvested at the study sites (as reported in this study)
<i>Gasteria bicolor</i>	East Cape endemic (following GRA herbarium practice) Heavily traded & unsustainably harvested at the study sites (as reported in this study)
<i>Gunnera perpensa</i>	Scarce, heavily traded or with a high price in South Africa ²²
<i>Haemanthus albiflos</i>	Protected ⁵⁷
<i>Haworthia attenuata</i>	East Cape endemic (following GRA herbarium practice) Protected ⁵⁷ Uncertain ⁵⁸ Heavily traded & unsustainably harvested at the study sites ¹⁶
<i>Hypoxis hemerocallidea</i>	Heavily traded, unsustainably harvested and with a high price at the study sites ¹⁶
<i>Ilex mitis</i>	Protected ⁵⁷ Heavily traded & unsustainably harvested at the study sites ¹⁶
<i>Ocotea bullata</i>	Unsustainably harvested at the study sites (as reported in this study) Scarce, heavily traded or with a high price in South Africa ²² Vulnerable ⁵⁶ Vulnerable & declining ⁴⁵
<i>Pachycarpus concolor</i>	Protected ⁵⁷
<i>Pelargonium reniforme</i>	East Cape near-endemic (following GRA herbarium practice) Heavily traded & unsustainably harvested at the study sites ^{59,60}
<i>Polystachya pubescens</i>	Protected ⁵⁷
<i>Protorhus longifolia</i>	Heavily traded & unsustainably harvested at the study sites ¹⁶
<i>Rapanea melanophloeos</i>	Scarce, heavily traded or with a high price in South Africa ²² Heavily traded & unsustainably harvested at the study sites ¹⁶
<i>Rhoicissus digitata</i>	Heavily traded & unsustainably harvested at the study sites ¹⁶
<i>Rhoicissus tridentata</i>	East Cape near-endemic (following GRA herbarium practice) Heavily traded & unsustainably harvested at the study sites (as reported in this study)
<i>Rubia petiolaris</i>	Heavily traded, unsustainably harvested and with a high price at the study sites ¹⁶
<i>Tritonia lineata</i>	Protected ⁵⁷
<i>Tulbaghia alliacea</i>	Scarce, heavily traded or with a high price in South Africa ²²
<i>Xysmalobium orbiculare</i>	Protected ⁵⁷
<i>Xysmalobium undulatum</i>	Protected ⁵⁷

Vegetation types

The survey revealed that the majority of medicinal plant material harvested for trade in the Eastern Cape Province comes from three biomes (*sensu* Low & Rebelo⁴⁴), that is, Grassland (Coastal Grassland, Southeastern Mountain Grassland, and Moist Upland Grassland, comprising 67 673 km², that is, 32.4% of the province's surface area), Thicket (Valley Thicket and Xeric Succulent Thicket, comprising 28 357 km², 13.7%) and Forest (Coastal Forest and Afromontane Forest, comprising 3701 km², 2.2%). Some species are also harvested from the Fynbos Biome

(Grassy Fynbos) in the west of the province. Of the 166 plant species traded by the survey respondents, 34% were harvested from Grasslands (36.2 t/yr); 23% from Valley Thicket (26.9 t/yr); 18% from Forest (26.9 t/yr); 13% from both Forest and Valley Thicket (15.4 t/yr); 12% are found in wetlands, disturbed areas and Grassy Fynbos (3.1 t/yr).

Based on these data (282 respondents, 166 plants, and 525 t/yr), it is estimated that approximately 0.5 kg of plant material is harvested per km² from Grassland, 0.9 kg/km² from Thicket, and 7.2 kg/km² from Forest. Forest is therefore significantly more

threatened by the medicinal plant harvesting than Grassland and Thicket. Cunningham⁴⁵ concurs that Afromontane Forest is the most threatened vegetation type in Africa. Lubke *et al.*⁴⁶ also prioritize the Thicket Biome for urgent conservation management action.

Conservation status

TRAFFIC East/Southern Africa⁴⁷ report that

...current nature conservation legislation in South Africa is regulated in terms of a highly fragmented potpourri of provincial ordinances, Acts, Decrees and Proclamations that are inconsistent, incomplete, outdated and overly complex making it difficult for conservation authorities, already facing budgetary and capacity constraints, to carry out their work effectively and efficiently. Furthermore there are no provisions dealing with the involvement of communities in regulating wildlife trade or the use of incentives to encourage persons involved in the trade to utilize natural resources in a sustainable manner.

In line with TRAFFIC East/Southern Africa recommendations,⁴⁷ the data provided here can serve as a useful tool for efforts to update the currently inadequate legislation, in that, for the first time in the Eastern Cape, it provides a list of names of traded medicinal plant species.

Three species listed in Table 1 are treated in the current Red Data List of Southern African Plants,⁴⁸ i.e. *Bowiea volubilis* (Insufficiently known), *Cassipourea flanaganii* (Rare) and *Ocotea bullata* (Vulnerable). The threat to *Cassipourea flanaganii* and *Ocotea bullata* due to medicinal plant harvesting has been documented in detail by Cocks & Dold⁴⁹ and Geldenhuys,⁵⁰ respectively. In addition to the above species, a further 31 species are highlighted in this paper for conservation and management attention based on the following criteria: taxa that are harvested unsustainably and traded in large quantities of material at the study sites are known to be rare or uncommon in the wild and/or are near-endemic, endemic or localized, and/or protected within the Eastern Cape Province (Table 4). An erroneous record of *Ledebouria hypoxidioides* (Schonl.) Jessop having been harvested to possible extinction in the Eastern Cape⁴⁵ is corrected in this paper. Although the species is localized, it is common within its range (unpubl. obs.) and has not been documented in this study as a traded species.

Discussion and conclusion

Although similar studies have been undertaken in other parts of South Africa, this initial study in the Eastern Cape Province shows that plant species traded differ considerably from the other studies, which emphasizes the importance of regional studies in documenting the trade. Our study revealed that approximately 525 tonnes of plant material, comprising at least 166 taxa and valued at approximately R27 million per annum, was traded annually in the study area alone. Individual species fetch prices as high as R68 per kg and are extremely valuable. The medicinal plant trade not only provides vital welfare for millions of consumers but it is also critical for the welfare of all the people engaged in the industry.² For example, 62% of the people involved in the trade are middle-aged black Africans, 75% are women, 50% have an education level below grade eight, and 62% earn less than R500 per month.

The medicinal plant industry plays a critical role in empowering a large number of women, and lack of access to it would leave them and their families destitute. Present harvesting is indiscriminate, destructive, and unsustainable for many species, particularly those harvested from Afromontane Forest.

Of the traditional healers interviewed, 54% indicated an

increase in the number of patients they had attended to over the last five years and 81% expected a further increase in the next five years, citing the HIV/AIDS pandemic as the main reason. The current demand for medicinal plants is therefore likely to increase and to have adverse consequences on the environment, particularly if wild plant material is not supplemented with cultivated material. To replace traditional medicines with modern Western medicines is neither practical nor appropriate,⁵¹ so it is crucial for steps to be taken to accommodate the medicinal plant trade in South Africa. As formal and traditional conservation measures have been largely unsuccessful, cultivation initiatives and new management programmes are essential regimes to conserve biodiversity and protect threatened species. The need for these regimes is acknowledged in developing countries throughout the world.⁵²⁻⁵⁴ There are, however, as yet few cultivation projects in southern Africa that can act as successful models.

Despite reservations about the acceptance of cultivated plant material in traditional healing practices,⁵⁵ 82% of the urban-based healers and 69% of the clinic patients interviewed in this survey reported that they would readily make use of cultivated plants for medicinal purposes. The high prices of some species make them potential new crop plants for small-scale farmers and village home gardens.

Our paper has prioritised 34 plant species for conservation and management attention and it is hoped that these research results can translate into improved management strategies that help to ensure the long-term survival of these species, and their continued accessibility to people who rely on trade in medicinal plants for health care and livelihoods.

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- Cunningham A.B. (1997). An Africa-wide overview of medicinal plant harvesting, conservation and health care. *Non-wood Forest Products* 11, 116-129.
- Mander M. (1998). *Marketing of Indigenous Medicinal Plants in South Africa. A Case Study in KwaZulu-Natal*. Food and Agriculture Organization, Rome.
- Cunningham A.B. (1989). Herbal medicine trade: a hidden economy. *Indicator South Africa* 6, 51-54.
- Dauskardt R. (1990). The changing geography of traditional medicine: urban herbalism on the Witwatersrand. Johannesburg. *Geojournal* 22, 275-283.
- Dauskardt R. (1991). Urban herbalism: the restructuring of informal survival in Johannesburg. In *South African Informal Economy*, eds E. Preston-Whyte and C. Rogerson, chap. 5, pp. 87-100. Oxford University Press, Cape Town.
- Kearns M. (1994). *Continuity and change: the commercialisation of traditional medicines*. B.A. Hons thesis, University of the Witwatersrand, Johannesburg.
- Mander M. (1997). *Medicinal Plant Marketing in Bushbuckridge and Mpumalanga: A Market Survey and Recommended Strategies for Sustaining the Supply of Plants in the Region*. Unpublished report, Danish Cooperation for Environment and Development, Danish Environment Protection Agency, Strandgade.
- Cocks M.L. and Dold A.P. (2000). The role of African chemists in the health care system of the Eastern Cape Province of South Africa. *Soc. Sci. Med.* 51, 1505-1515.
- Cunningham A.B. (1991). The herbal medicine trade: resource depletion and environmental management for a hidden economy. In *South Africa's Informal Economy*, eds E. Preston-Whyte and C. Rogerson, chap. 12, pp. 196-206. Oxford University Press, Cape Town.
- Macdonald I.A.W. (1984). Witch-doctors versus wildlife in southern Africa. *African Wildlife* 38, 4-9.
- Cunningham A.B. (1988). *An investigation of the herbal medicinal trade in Natal/KwaZulu*. Institute for Natural Resources Investigational Report No. 29, Pietermaritzburg.
- Williams V. (1996). The Witwatersrand muti trade. *Veld and Flora* 82, 12-14.
- Williams V., Balkwill K. and Witkowski E. (1997). Muthi traders on the Witwatersrand, South Africa — an urban mosaic. *S. Afr. J. Bot.* 63, 378-381.
- Williams V.L., Balkwill K. and Witkowski E.T.E. (2000). Unraveling the commercial market for medicinal plants and plant parts on the Witwatersrand, South Africa. *Econ. Bot.* 54, 310-327.

15. Cocks M.L. and Dold A.P. (2000). *The Medicinal Plant Trade in the Eastern Cape Province*. Unpublished report, Department of Water Affairs and Forestry, Pretoria.
16. Dold T. and Cocks M. (2001). The trade in medicinal plants in the Eastern Cape Province, South Africa. *TRAFFIC Bulletin* 19, 11–13.
17. Dold T. and Cocks M. (2001). A succulent herbal — the medicinal and cultural use of some succulent plants traded in the Eastern Cape Province of South Africa. *Cactus and Succulent Journal* 73, 141–145.
18. Cunningham A.B. (1988). Over-exploitation of medicinal plants in Natal/KwaZulu: root causes. *Veld and Flora* 74, 85–87.
19. Makoe A. and Matthews R. (1994). *Muthi Trade. On Track*, Summer 1994, 12–14.
20. Wait A. (1998). Mind the muti. *Conserva* 3, 4–5, 22.
21. Botha J. (2001). *Perceptions of species availability and values of medicinal plants traded in areas adjacent to the Kruger National Park*. M.Sc. thesis, University of the Witwatersrand, Johannesburg.
22. Marshall N.T. (1998). *Searching for a Cure: Conservation of Medicinal Wildlife Resources in East and Southern Africa*, pp. 74–80. TRAFFIC International, Cambridge.
23. South African Institute of Race Relations (1999). *Fast Facts* 1, 1–2. Johannesburg.
24. Cocks M. L. and Möller V. (2002). Use of indigenous and indigenised medicines to enhance personal well-being: a South African case study. *Soc. Sci. Med.* 54, 387–397.
25. Hassan R. and Haveman J. (1997). *The values and rates of harvesting natural forest and woodland products for direct use by communities in the Eastern Cape Province*. Unpublished report, Development Bank of South Africa, Midrand.
26. Ainslie A., Cinderby S. and Petse S. (1997). *Rural livelihoods and local-level natural resource management in Peddie district*. Unpublished report, Institute of Social and Economic Research, Rhodes University, Grahamstown.
27. Ainslie A. (1999). When ‘community’ is not enough: managing common property natural resources in rural South Africa. *Development Southern Africa* 16, 375–401.
28. Dold A.P. and Cocks M.L. (2000). Indigenous plant use of the amaXhosa people on the eastern border of the Great Fish River Reserve, Eastern Cape. *Annals of the East Cape Museums* 1, 26–53.
29. Shackleton C.M., Shackleton S.E., Ntshudu M. and Ntsebeza J. (2002). The role and value of savanna non-timber forest products to the rural households in the Kat River Valley, South Africa. *J. Trop. For. Prod.* 8, 45–65.
30. Holdstock T.L. (1978). *Economic aspects of indigenous healing*. Unpublished paper presented at the Conference on the Economics of Health Care in Southern Africa, Cape Town, September 1978.
31. Hirst M. (1990). *The healer’s art: Cape Nguni diviners in the township of Grahamstown*. PhD thesis, Rhodes University, Grahamstown.
32. Pretorius E., De Klerk G.W. and Van Rensburg H.C.J. (1993). *The traditional healer in South African health care*. Co-operative HSRC Programme: Affordable Social Provision Report ASS/BBS–27. Pretoria.
33. Cocks M.L. (1997). *Towards an understanding of Amayeza esiXhosa stores (African chemists). How they operate, and the services they offer in the Eastern Cape*. M.A. thesis, Rhodes University, Grahamstown.
34. Matsiliza B. (1997). *Plants used in traditional medicine in Grahamstown*. B.Sc. Hons. thesis, Rhodes University, Grahamstown.
35. Dold A.P. and Cocks M.L. (1997). *Amayeza esiXhosa — an insight into Xhosa medicine. The Phoenix (Eastern Cape Museum Magazine)* 9, 4–9.
36. Dold A.P. and Cocks M.L. (1999). Preliminary list of Xhosa plant names from the Eastern Cape, South Africa. *Bothalia* 29, 267–292.
37. Dold A.P. and Cocks M.L. (2000). The medicinal use of some weeds, problem and alien plants in the Grahamstown and Peddie Districts of the Eastern Cape, South Africa. *S. Afr. J. Sci.* 96, 467–475.
38. Dold A.P. and Cocks M.L. (2001). Traditional veterinary medicine in the Alice district of the Eastern Cape Province, South Africa. *S. Afr. J. Sci.* 97, 375–379.
39. Watt J.M. and Breyer-Brandwijk M.G. (1962). *The Medicinal and Poisonous Plants of Southern and Eastern Africa*, 2nd edn. Livingstone, London.
40. Hutchings A., Lewis G. and Cunningham A. (1996). *Zulu Medicinal Plants*. University of Natal Press, Pietermaritzburg.
41. Statistics South Africa, Census 1996. [Http://www.statssa.gov.za/census.st](http://www.statssa.gov.za/census.st)
42. Hirschowitz R. and De Castro J. (1995). In *A National Household Survey of Health Inequalities in South Africa*, chap 6, pp. 63–76. Community Agency for Social Enquiry, Durban.
43. Struhsaker T.T. (1996). A biologist’s perspective on the role of sustainable harvest in conservation. *Conserv. Biol.* 12, 930–932.
44. Low A.B. and Rebelo A.G. (1996). *Vegetation of South Africa, Lesotho and Swaziland*. Department of Environmental Affairs and Tourism, Pretoria.
45. Cunningham A.B. (1993). African medicinal plants: setting priorities at the interface between conservation and primary healthcare. *People and Plants Working Paper* 1, 1–50.
46. Lubke R.A., Everard D.A. and Jackson S. (1986). The biomes of the eastern Cape with emphasis on their conservation. *Bothalia* 16, 251–261.
47. Burgener M. (2001). Nature conservation legislation reviewed in South Africa. *TRAFFIC Network Dispatches* 17, 1.
48. Hilton-Taylor C. (1996). *Red Data List of Southern African Plants*. National Botanical Institute, Pretoria.
49. Cocks M.L. and Dold A.P. (2002). The informal trade of *Cassipourea flanaganii* as a cosmetic in South Africa. In *Ethnobiology and Biocultural Diversity: Proc. 7th International Congress of Ethnobiology*, eds J.R. Stepp, E.S. Wyndham, and R.K. Zarger, pp. 412–427. International Society of Ethnobiology, Athens, Georgia.
50. Geldenhuys C. (in press). Meeting demands for bark for medicinal use and forest conservation: the case of the timber tree *Ocotea bullata*. In *The Use and Socio-economic Value of Indigenous Forest and Woodland Resources in South Africa*, eds M. Lawes, H. Eeley, C. Shackleton and B. Geach. University of Natal Press, Pietermaritzburg.
51. Cunningham A.B. (1984). Are we barking up the wrong tree? Medicinal plants and witch doctors. *African Wildlife* 38, 247–249.
52. De Beer J.H. and McDermott M.J. (1996). *The Economic Value of Non-timber Forest Products in Southeast Asia*. IUCN, Amsterdam.
53. Leakey R.R.B., Temu A.B., Melnyk M. and Vantomme P. (1996). Domestication and commercialisation of non-timber forest products in agroforestry systems. *Non-wood Forest Products* 9, 1–297.
54. Ruiz-Perez M. and Arnold J.E.M. (eds) (1996). *Current Issues in Non-timber Forest Products Research*. Centre for International Forestry Research, Bogor.
55. Prins, E.E. (1996). Prohibitions and pollution at a medicinal plant nursery: customary implications associated with ethnobotanical reserves in conservation areas of KwaZulu-Natal. *Natal Museums Journal of Humanities* 8, 81–93.
56. Scott-Shaw, R. (1999). *Rare and Threatened Plants of KwaZulu-Natal and Neighbouring Regions*. Scientific Services Directorate, KwaZulu-Natal Nature Conservation Service, Pietermaritzburg.
57. Cape Nature and Environmental Conservation Ordinance (1997). Ordinance No. 19 of 1974, Schedule 4, 11–18.
58. Everard D.A. (1985). *The conservation status of some unique plant communities in the Eastern Cape*. M.Sc. thesis, Rhodes University, Grahamstown.
59. Gerardy J. (2002). Nine arrests for digging out East Cape medicinal plant. *Daily Dispatch* (East London), June, 8.
60. Bisseker C. (2002). Biodiversity bloom is off natural cure. *Financial Mail* (Johannesburg), July 19, 17.