

CHAPTER 3

CULTIVATION OF MEDICINAL PLANTS AS A TOOL FOR BIODIVERSITY CONSERVATION AND POVERTY ALLEVIATION IN THE AMATOLA REGION, SOUTH AFRICA

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Abstract. This paper describes the assumptions and results of a study to assess whether cultivation of medicinal plants can serve as a tool for combined biodiversity conservation and poverty alleviation. The study was carried out in the Amatola region of Eastern Cape, South Africa, where sustained beliefs in medicinal plant use, also under non-traditional conditions, has resulted in an increase in commercial demands. It was based on the assumption of poverty alleviation not only referring to an increase in income and labour, but also an increase in social capital and human dignity. The study assessed the local perceptions of the use and cultivation of medicinal plants and the need for conservation of these plants, as well as the features of already ongoing cultivation practices and options for increased cultivation. It consisted of participatory assessments in three villages involving around 250 persons and participatory trials with 14 rural women selling medicinal plants on urban markets. The study indicated that the growing demand for medicinal plants is related to the great cultural significance attached to medicinal plants. The growing demand has not only resulted in increased hazard for overexploitation of wild plant populations, but also increased interest in cultivation. Several factors need attention in linking of biodiversity conservation and poverty alleviation: (a) selection of specific target groups and the identification of the links between cultivation practices and livelihood conditions, (b) role of cultural factors in medicinal plant use and cultivation, and (c) cultivation by local people being not primarily based on local awareness of the loss of wild species, but on local perceptions about financially lucrative medicinal plants. It is concluded that the scope for cultivation of medicinal plants for combined biodiversity conservation and poverty alleviation should not be considered light-heartedly. However, the impact can be positive in case cultivation is considered within the context of protecting and strengthening the cultural values of biodiversity and creating a positive attitude towards biodiversity conservation in general.

Keywords: cultural values; financial values; medicinal-plant traders; participatory technology development

INTRODUCTION

Since the Johannesburg Earth Summit in 2002 much attention has been given to the possibility of combining biodiversity conservation and poverty alleviation. Within this context the option of stimulating the production of non-timber forest products (NTFPs) is often considered promising (Arnold and Perez 2001; Wunder 2001). When considering the potential of NTFP production to contribute to poverty alleviation two options need attention, e.g., the stimulation of either sustainable exploitation of wild NTFPs in natural forests or cultivation in farming systems (Wong and Hall 2004; Ros-Tonen and Wiersum 2005). These development options are well illustrated in the case of medicinal plants. In many countries medicinal plants are collected from the wild vegetation. But in response to the combined impacts of dwindling supplies due to overexploitation of the natural resources and increasing demands due to population growth and growing global markets medicinal plants are also increasingly introduced into farming systems. Such cultivation often takes place in multiple cropping systems including agroforestry systems. For instance, medicinal plants may be planted in the lower strata of multistrata systems such as homegardens (Rao et al. 2004).

The two types of medicinal plant exploitation can be related to two different conservation strategies: *in situ* preservation through development of improved forms of controlled use of naturally growing plants, and *in domo* conservation through development of cultivation practices as a means to conserve the species within the human domain (Heywood 1999; Wiersum 2003). It is increasingly recognized that within the context of combining biodiversity conservation and poverty alleviation, not only *in situ* preservation of valuable wild plant species should be given attention, but also *in domo* conservation (Ros-Tonen and Wiersum 2005). This form of conservation is based on the understanding that rather than a dichotomy between wild and cultivated lands there exist a wide array of plant production systems and different degrees of (semi)domestication of wild plants (Wiersum and Shackleton 2005). The process of domestication is often interpreted as referring to the modification of a plant's morphological characteristics and genetic make-up as well as the artificialization of the biophysical environment in which the plant is growing. In a broader sense, however, the concept has been interpreted as also including the acculturation of a plant to a social management environment (Wiersum 1997). Under the first interpretation, the process of stimulating domestication is normally considered a two-phased process in which first proper crop cultivation techniques are developed by scientists, followed by subsequent transfer of the scientifically developed domestication technology to potential growers. According to the more inclusive second interpretation, the stimulation process involves a socio-technical approach in which attention is given to the interaction between technical, cultural and institutional dimensions of domestication. According to this interpretation, technology development is not a value-free process, but rather a process in which human values and technical options are interrelated. Especially when addressing the development needs of underprivileged groups of people, it is considered essential that technologies are developed that are adjusted to the specific social values and livelihood assets of the intended target groups.

This paper will discuss the design and results of a multi-focused study on the scope for cultivation of medicinal plants as a means to contribute towards poverty alleviation. The study was designed in accordance with the concept of domestication as a multi-dimensional process involving technical, cultural and institutional changes. Consequently, the stimulation of cultivation was conceived of as involving a location-specific development process in which cultivation practices are developed on the basis of both technical options, socio-cultural conditions and specific livelihood conditions of the intended cultivators. First we will elaborate what aspects are of importance when designing research projects aiming at the stimulation of medicinal plant cultivation as a means to poverty alleviation. Next we will sketch the importance of medicinal plants in South Africa and describe the research area and methodology. Then we give an overview of local perception regarding the use and cultivation of medicinal plants as well as the local beliefs regarding the need for conservation of medicinal plants. Finally, we describe the results of experimental trials to stimulate medicinal plant cultivation by female medicinal plant hawkers. This information will serve to answer the question: What aspects need attention when stimulating medicinal plant cultivation as a means to contribute towards a combination of *in domo* conservation and poverty alleviation?

DESIGNING RESEARCH ON STIMULATION OF MEDICINAL PLANT CULTIVATION AS A MEANS TO POVERTY ALLEVIATION

When designing research on options for stimulating cultivation of medicinal plants within the framework of a biodiversity conservation and poverty alleviation approach, two aspects need careful consideration, viz., how to interpret the concept of poverty alleviation and what research approach should be applied. These two aspects are interrelated. At present it is agreed that the concept of poverty has several dimensions. In the past it was thought that it referred to an increase in income and employment, but at present it is understood to include also an increase in social and cultural capital. Poverty alleviation should not only be conceived of as relating to a person's instrumental ability to make a living, but also to a person's ability to make life meaningful and to undertake emancipatory action (Bebbington 1999). Within the context of contributing towards meaningful activities, it is interesting to note that in South Africa *amayeza* are not only used for healing of physical illnesses, but also for protection against misfortunes with natural and supernatural causes for cultural ceremonies (Du Toit 1980; Hammond-Tooke 1989; Cocks and Møller 2002). Therefore, conservation of these species will affect the ability for local people to continue their cultural assets. However, the strong cultural component of 'medicinal' plant use may also prove a constraint for *in domo* conservation. This is related to the belief that metaphysical dangers may destroy the healing powers of plants, and that collection of the plants from the wild is part of the ritual use of *amayeza* (medicinal plants *sensu lato*) (Prins 1996). Programmes to stimulate cultivation should carefully consider such cultural values.

Within the context of contributing to emancipatory action, two aspects are of relevance. In the first place it is important that research projects employ a

participatory research approach in which researchers should facilitate and stimulate experiments by the intended target groups rather than act as technology developers themselves. In the second place, the selection of species as well as cultivation practices should as much as possible complement any already existing local experiences on cultivating medicinal crops. Rather than supposing that all medicinal crops are still collected from the wild vegetation without consideration to trends in availability, it should be investigated what local knowledge on trends in availability of the medicinal crops exist and whether individual local innovators have already started cultivating medicinal plants. Such sporadic local knowledge could form an entrance point for stimulating further innovations.

USE OF MEDICINAL PLANTS IN SOUTH AFRICA

Medicinal plants (locally called *muthi* in Zulu language and *amayeza* in Xhosa language) are still widely used in the health-care system of South Africa, particularly by the African population. According to Mander and Le Breton (2005) there are up to 100 million traditional-remedy consumers in southern Africa and as many as 500,000 traditional healers. Up to 700,000 tonnes of plant material is consumed annually with an estimated value of as much as 150 million US dollars per annum. Medicinal plants are often a basic requirement for the treatment of certain conditions irrespective of education and income levels (Cocks and Dold 2000). The use of traditional medicine is not confined to rural, low-income groups, but also prevails in urban areas.

The trade in traditional medicines forms part of a multimillion-rand 'hidden economy' in southern Africa (Cunningham 1989). Stimulated by high population growth rates, rapid urbanization and the important cultural value placed on traditional medicines this trade is now greater than at any time in the past. At a national level, it is estimated that annually 20,000 tonnes of material from over 700 plant species are traded, with a value of approximately R 270 million (US\$ 60 million) (Mander 2004). The use and trade of plants for medicine is no longer confined to traditional healers, but has entered both the informal and formal entrepreneurial sectors of the South-African economy, resulting in an increase in the number of herbal gatherers and traders (Cunningham 1989; Dauskardt 1990; 1991; Cocks et al. 2004).

The intensive harvesting of wild medicinal plants due to the increasing use has in many places resulted in overexploitation, and forms a serious threat to biodiversity in the region. Several studies attest to a trend of increasing harvesting pressures on traditional supply areas linked to a growing shortage in supply of popular medicinal plant species. The current demand for certain taxa exceeds supply, with traders reporting acute shortages and price increases of these. As a result, several plant species have been exploited to such an extent that they are seldom found in unprotected areas (Cunningham 1991b; 1991a; Williams 2004).

Until recently, biodiversity conservation in South Africa was based on a law enforcement approach, but it has become increasingly evident that this approach has failed and that new, participatory methods are required. In response to the

overexploitation of natural populations of medicinal plants, several efforts have recently been attempted to conserve the diversity of medicinal plants. Two new approaches are gaining increasing attention, i.e., conservation of biodiversity by local community groups (Fabricius et al. 2004) and stimulation of cultivation as a means to relieve the over-exploitation of natural populations (Mander et al. 1996; Cunningham 1991a). A first systematic effort to stimulate cultivation of medicinal plants was initiated by the Durban Parks Department in 1983 by establishing a medicinal plant nursery in the Silverglen Nature Reserve (Crouch and Edwards 2004). Since this initiative, several other efforts have been undertaken to stimulate medicinal plant cultivation through the establishment of medicinal plant nurseries. Originally, most attention was given to the establishment of such professionally managed nurseries as a means of making quality plant material available to local people and as a training centre for teaching them suitable cultivation techniques. However, gradually interest has grown in further stimulating medicinal plant cultivation by augmenting the outreach activities with more active participatory technology development. These development efforts are based on the principle discussed above, that the stimulation of domestication of medicinal plants should not be regarded as a process of transfer of professionally developed cultivation techniques, but rather as a process of change in institutionally embedded local resource use and management practices. Based on these premises, in 2002 researchers of Rhodes University, South Africa, together with collaborators from Wageningen University, The Netherlands, started a research project to assess the possibility to link biodiversity conservation and poverty alleviation, by stimulating medicinal plant cultivation by people who at present depend on medicinal plant trade for maintaining their livelihoods.

STUDY SITE AND METHODOLOGY

The project took place amongst the Xhosa people living in the Amatola region in South Africa. This area belongs to one of the former homeland areas in the present Eastern Cape province. The province is home to 15.5% (6.3 million) of South Africa's total population (40.6 million in 1996). Eighty-six percent of the Eastern Cape population is African, 37% is urbanized, 41% of the households live in traditional dwellings and 49% is unemployed while 31% of those employed earn less than R 500 a month. The province incorporates two of the former 'homelands' of the apartheid era, viz., Ciskei and Transkei. In these former homeland areas many aspects of traditional culture are still part of everyday life, even though many of the inhabitants used to work as industrial labourers and are now dependent on state grants such as pension payments. As a result of the past political and economic changes, at present a large proportion of the population is to some extent reliant on natural resources for direct subsistence use or as a form of income generation. (Cocks and Wiersum 2003; Shackleton et al. 2002). Due to the low socioeconomic standing of the predominantly rural and periurban Eastern Cape population the vast majority of people use traditional methods of health care, and consequently medicinal plant use is still very common. There is a vibrant and sizeable trade of

medicinal plants, most of which are collected from the wild causing high demands on the natural resource base (Dold and Cocks 2002; Cocks et al. 2004). Many medicines are derived from roots and bulbs, which are especially vulnerable to the increasing harvesting pressure. Moreover, the harvesting techniques for medicinal products from tree bark are often unsustainable. Consequently, there are clear signs of depletion of stocks in several areas (Dold and Cocks 2001).

Research methodology

In order to assess whether a conscious combination of *in domo* resource conservation and poverty alleviation is feasible in the research area, a multi-level study was carried out. The first phase concerned a series of participatory appraisals in order to contextualize the present social and cultural aspects of use and cultivation of *amayeza*. A series of surveys, in-depth interviews and workshops took place amongst the households in Cwengcwe and adjacent villages in the Amatola district (Figure 1). Approximately 250 people participated in these surveys. Further details on these participatory appraisals and their results are given by Husselman and Postma (in prep.).



Figure 1. Research location

The second phase consisted of participatory cultivation trials with purposefully selected potential growers from underprivileged people. The selection of this target groups was based on the consideration that the project should explicitly address the

option for domestication of medicinal plants by poor people who are already actively engaged in the medicinal plant trade. It was thought that this would provide the best chance that the cultivation practices will replace the collection of wild plants rather than form only an additional production source. Within the medicinal plant trade, four main categories of stakeholders can be distinguished in the research area, viz., informal gatherers, hawkers, traditional healers and *amayeza* store owners (Cocks et al. 2004). The hawkers, who can also be informal gatherers, are the poorest of these stakeholders. They are predominantly (75%) women, have a low level of education (50% having no schooling at all and 41% having left school after junior level) and the majority (57%) is earning less than R 500 per month. Over 80% of these hawkers live in rural areas and commute daily to urban areas where they maintain informal trading stalls. Periodically they collect plants or they sell plants from other village people (Cocks et al. 2004). As target group for the participatory cultivation trials the project selected a group of 14 women hawker traders selling medicinal plants at the King Williamstown informal market (Figure 1). These women reside in different villages within the Amatola District Municipality and travel almost daily to the urban market places. Homegardens were selected as the best location for the cultivation trials. In the first place, homegardens are normally the women's domain as well as the last land resort for poor people (Ninez 1984). Moreover, in homegardens both domesticated and wild plants are usually grown, and they often serve as experimental areas for new crops (Ninez 1984; High and Shackleton 2000).

CULTURAL PERCEPTIONS ON THE USE OF MEDICINAL PLANTS

From the appraisals it appeared that in the research area over one hundred plant species are used as *amayeza*. The *amayeza* not only have a utilitarian value for healing physical illnesses, but also have important cultural values. The Xhosa people generally do not differentiate between the causation of diseases and misfortunes (Cocks and Møller 2002), and *amayeza* can be used both for healing and for protection against misfortunes with natural and supernatural causes. The use of medicinal plants for protection against misfortune may involve protection against evil spirits, treatment of sorcery impacts and use of *amayeza* as luck charms. The distinction between these use categories is not absolute; an example of culturally inspired health treatment is the use of specific medicinal plants for purging purposes or for cleansing the blood. *Amayeza* may also be used in traditional ancestral-related ceremonies. This mostly concerns the species *Olea europaea* subsp. *africana* (locally called *umnquma*), *Ptaeroxylon obliquum* (*umthathi*), *Rubia petiolaris* (*impendulo*) and *Silene undulata* (*unozitholana*). Approximately 90% of the people in the study site use these species during the ritual sacrifice of a domestic animal on behalf of the ancestors (*isisiko*).

Many people believe in the risk of metaphysical dangers destroying the healing powers of *amayeza*. Two broad categories of metaphysical dangers can be distinguished. The first is related to the belief that the ancestors are responsible for the healing powers of *amayeza* species and therefore these need to be respected. As

a result there are specific traditional regulations on how to handle *amayeza* species. Explanations on the exact nature of these rules varied between respondents, but the most widespread opinion was that polluted people should avoid contact with these plants. 'Pollution' is a temporary state of being, associated with an increased risk of contamination by evil spirits (Ngubane 1977; Hammond-Tooke 1989). A person is considered polluted during menstruation, after sexual intercourse, after childbirth and when there is a death in the household. Additionally, travelling to distant places may cause pollution. This condition lasts several days (opinions on the precise number varied between respondents) or until ritual cleansing with, e.g., *Drimia capensis* (*inqwebeba*) has occurred. The second metaphysical danger is witchcraft/sorcery: people with the proper know-how could deliberately destroy the powers of the *amayeza* species. Once again, opinions on this subject differed between respondents. Some of the respondents only believed that witchcraft could affect people and not *amayeza*, while others believe that *amayeza* species could only be destroyed if others know what they are used for.

During the appraisals, some people voiced concerns about the loss of interest of young people in using *amayeza*. However, in a special survey amongst grade-9 and -10 highschool students it was found that although 95% of the students use medicines from health clinics, still 82% are also using *amayeza* for both healing and protection purposes. Almost 80% of the students stated that they would continue using *amayeza* in the future. And in a parallel preliminary school survey, children mentioned that they believed that the cultural forms of wild-plant use would continue even if utilitarian uses such as fuelwood would be replaced by modern substitutes (Cocks and Wiersum 2003).

CULTURAL BELIEFS ON THE CULTIVATION OF AMAYEZA

The beliefs in the metaphysical dangers destroying the healing powers of *amayeza* have repercussions in respect to the acceptance of cultivated plants. In a survey amongst 88 respondents, 50% of the respondents were not sure if the rules for handling harvested *amayeza* in such a way that they fulfil the cultural requirements are also applied when cultivating them. Only 24% felt that cultivated *amayeza* are highly susceptible to losing their effectiveness when touched by polluted people, whilst others believed that this could only happen after the plants are harvested or through deliberate contact. Opinions on the species that could be affected also differed; 30% of the respondents believed that all cultivated *amayeza* could lose their power when touched by polluted people, and 20% felt that only some species could be affected. Planting *amayeza* species in a separate and secluded place within the homegarden was perceived by almost all the respondents as a viable means to reduce the risk of contact with polluted people. Related to this, 28% of the respondents considered it necessary to keep the fact that one is cultivating *amayeza* species secret, and 41% felt that they could not openly share what they used their *amayeza* species for. Only a few people thought it was possible to protect *amayeza* from witchcraft/sorcery.

Despite these potential dangers, 89% of the respondents stated that they would

use cultivated *amayeza* for healing or protection purposes. However, those species that are collected following ritual practice and species indicated by the ancestors in dreams could only be collected from the wild to remain effective. Thirty-eight percent of the respondents considered it inappropriate to use cultivated *amayeza* species for ritual purposes. The most common reason given was that the collection of the plants from the wild is an essential part of the ritual. Others argued that *amayeza* species are mainly sensitive to loss of effectiveness through contact with polluted people and witchcraft, and that it is not the cultivation *per se*, but rather the proper handling of species during cultivation which impacts on their power.

PERCEPTIONS ON THE NEED FOR CONSERVATION OF AMAYEZA

From the appraisals it appeared that in around 60% of the households at least one household member collects *amayeza* for their own use or as a trade product. One quarter of the gatherers do this mainly as a means of income generation, either as traditional healer or as trader. An additional 25% of the people not only collect for their own use, but also for neighbours or family members. Around 40% of the households are already cultivating medicinal plants. Over 50% of the households purchase *amayeza* from other villagers or from hawkers in towns. Some of these buyers are not collecting *amayeza* themselves, but others only buy those *amayeza* that they cannot find themselves.

In general people are aware that the present collection of wild *amayeza* is unsustainable. About 70% of the people said that some species were difficult to find, and just over 30% stated that certain species had completely disappeared. The decrease was considered to be caused primarily by state laws limiting access to forest products rather than overexploitation. Although people acknowledged the decrease in availability in *amayeza*, hardly any concentrated efforts to address this danger have been undertaken in the study area. Although legislation allows for the controlled access to NTFPs in state forests, in the research area initial efforts at participatory forest management were not yet successful.

EXISTING CULTIVATION PRACTICES AND INTEREST IN INCREASED CULTIVATION

Although people did not explicitly mention cultivation of *amayeza* as a means to offset the effects of decreasing access to wild populations, many people are already cultivating at least some *amayeza*. In the appraisal study it was found that 42% of the households are actually cultivating *amayeza* (Figure 2; see colour pages elsewhere in this book). These cultivators involve both male and female persons. Cultivation is restricted to the homegardens. Only a quarter of the respondents in the appraisals had planted more than three species. Sometimes cultivation involves the maintenance of plants that germinated naturally in the garden. In the case that several species are cultivated, this often involves (female) traditional healers who wanted to have easy access to plants to treat their patients.

Although the number of species cultivated per person is only very limited, in the

appraisal study over 50 species were found to be present in the homegardens. The most popular are *Artemisia afra*, *Eucomis autumnalis*, *Tulbaghia acutiloba*, *Agapanthus praecox* and *Drimia elata* (Table 1). This almost exclusively involves herbaceous and bulbous species that are relatively easy to propagate and which provide quick yields. Most plant propagation material is collected from the wild and transplanted in the gardens. Only 18% of the cultivated species are slow-growing woody species. Due to the impacts of the cultural beliefs surrounding the use of *amayeza*, the plants are often planted in secluded spots of the gardens and they are not mixed with vegetables or other food crops in order to prevent loss of power.

Table 1. The ten most frequently cultivated *amayeza* in order of frequency

No.	Numeric and relative frequency*	Botanical name, Xhosa name	Growth form and plant part used
1.	18 40%	<i>Artemisia afra</i> Umhlonyane	Shrub Leaves and flowers
2.	12 27%	<i>Agapanthus praecox</i> Umkhondo	Small plant Tuber
3.	10 22%	<i>Drimia elata</i> Umrateni	Small plant Bulb
4.	7 16%	<i>Tulbaghia acutiloba</i> Itswele lomlambo	Small plant Bulb
5.	7 16%	<i>Eucomis autumnalis</i> Inguduza 28	Small plant Bulb
6.	5 11%	<i>Haworthia attenuata</i> Intelezi encinci	Succulent Whole plant
7.	5 11%	<i>Ruta graveolens</i> Ivendrik	Shrub Leaves
8.	4 9%	<i>Gasteria bicolor</i> Intelezi	Succulent Leaves
9.	4 9%	<i>Silene undulata</i> Unozitholana	Small plant Roots
10.	3 7%	<i>Hypoxis hemerocallidea</i> Inongwe	Small plant tuber

*Frequency refers to the number of households (n=45) cultivating species

Source: Husselman and Postma (in prep.)

Results of trial cultivations

The women hawkers who participated in the trials were predominantly (80%) under 50 years of age, and about 65% had achieved grade-7 education against an average of grade 5 for the overall local population. They were either a head of the household (36%), a wife of the household head (28%) or a daughter; households consisted in 50% of the cases of at least six persons. The plants sold by them are partly collected by themselves (around six species) and partly bought from other collectors (14 species). The time spent on travelling to the market and trading was on average 57 hours per week, while time spent on collecting and preparing medicinal plants was

on average less than 11 hour per week. The estimated net income from the medicinal plant trade is R 2400 - 7200 per annum. They were generally well aware that overharvesting (mentioned by about 80%) and poor harvesting methods (mentioned by around 15%) have resulted in a decrease of medicinal plants.

The trial participants were already more intensively involved in medicinal plant cultivation than the average local households: 64% were already cultivating an average of four species. After attending a training workshop at a medicinal plant nursery their interest in cultivation further increased. This increased interest was primarily based on their ideas regarding the commercial values of the plants, while ideas on scarcity of species or cultural issues played only a minor role (Table 2). Similar motives were found regarding the selection of species for cultivation (Table 3). Also in this case financial motives were stronger than cultural motives: preferred

Table 2. Reasons for medicinal plant cultivation by trial cultivators

Stated reason	Percentage respondents
Don't have to purchase species in the future	28%
Cultivation contributes to livelihoods	21%
Scarcity of certain species	21%
Don't have to travel to collect plants	14%
Meet high demand for certain species	7%
Cultural preservation	7%

Table 3. Preferred species for intensified homegarden cultivation

Botanical name	Xhosa name	Frequency (n=14)
<i>Silene undulata</i>	Unozitholana	8
<i>Haemanthus albiflos</i>	Umathunga	7
<i>Siphonochilus aethiopicus</i>	Isiphephetho	6
<i>Hypoxis hemerocallidea</i>	Inongwe	5
<i>Bulbine latifolia</i>	Irooiwater	4
<i>Alepidea amatymbica</i>	Iqwili	4
<i>Eucomis autumnalis</i>	Inguduza	4
<i>Crassula vaginata</i>	Uphuncuka	3
<i>Bowiea volubilis</i>	Umagaqana	3
<i>Dioscorea sylvatica</i>	Uskolpathi	2
<i>Warburgia salutaris</i>	Isibara	2
<i>Rubia petiolaris</i>	Impendulo	2
<i>Drimia elata</i>	Umrateni	2

species were selected on the basis of criteria such as high demand and financial value, and cultural restrictions played only a role with respect to a few specific species (e.g., *Cassipourea flanaganii* is not liked for cultivation as it is believed to attract lightning). In addition, availability of propagation material, ease of cultivation and drought resistance played a role, while hardly mention was made to the need to conserve rare or endangered species. A comparison between the species

preferred for cultivation by local people with a list of 34 prioritized species for conservation (Dold and Cocks 2002) indicated that only 50% of these 34 species were considered important for cultivation.

However, the cultivation trials were not uniformly successful. As reported also in other South-African studies (Crouch and Edwards 2004) local cultivation is hindered by several technical constraints, most notably lack of water for irrigation, but also difficulties with propagation and lack of experience with proper cultivation requirements with respect to soil and light conditions. Notwithstanding the fact that women hawkers are used to dealing with *amayeza*, they often buy part of the stock from local collectors rather than collecting all plants themselves or having them collected by their family members. Consequently, they have only limited knowledge of natural growing conditions of most *amayeza*. Moreover, as the existing cultivation practices are often carried out in a rather secluded manner, there is little exchange of information amongst cultivators. Finally, there is a trade-off between time spent in trade and in cultivation. In such cases other household members including husbands or children have a major role to play in cultivation.

CONCLUSIONS

At present increasing attention is given to the stimulation of medicinal plant cultivation as a means to combine biodiversity conservation and poverty alleviation. As indicated by our case study, in order to link *in domo* conservation of medicinal plants effectively with poverty alleviation, several aspects merit careful attention, starting with a clear conceptualization of the notion of poverty alleviation. This notion can be interpreted as relating to an increase in income and employment as well as to an increase in human capital and dignity. Considering the role of medicinal plant cultivation in contributing to increased income and employment of poor people, the study has been ongoing for a too limited period to present clear results on income effects.

The study indicated various factors that need attention when planning the linking of biodiversity conservation with increased income generation. It is essential to give careful attention to the selection of specific target groups and assessment of their livelihood conditions, and to identify how cultivation practices can be adjusted to these livelihood conditions. In our project perhaps the selection of the target group was not optimal. The women hawkers spend most of their time at the market rather than at home, and thus cultivation competes with their trading activities. Moreover, in contrast to initial assumptions, they were not all collecting the traded medicinal plants themselves. Further cultivation trials should focus stronger on the primary *amayeza* collectors.

It is also important to recognize that medicinal plant cultivation as a means for *in domo* conservation by local people is not just based on local awareness of the loss of wild species, but rather on awareness to optimize income from medicinal plants. Consequently, stimulation of cultivation as a means to combine biodiversity conservation and poverty alleviation should not be primarily focused on national concerns regarding endangered species, but rather on local concerns regarding

economically attractive use of biodiversity. However, these two categories are not mutually exclusive. Moreover, it should be recognized that efforts to stimulate *in domo* conservation are often frustrated by locally perceived limitations in livelihood activities due to efforts at *in situ* conservation. Stimulation of *in domo* conservation by local people should not be seen as a compensation of loss afflicted by state-controlled *in situ* conservation schemes, but rather as a compliment to local participation in *in situ* conservation. The stimulation of cultivation should become part of participatory forest management programmes.

Considering increasing human capital and dignity as important elements of poverty alleviation, our data indicate that medicinal plants may play a significant role in the maintenance of cultural identity. Biodiversity loss does not only entail a loss in biological resources, but may also involve a loss of cultural practices. The cultural value attributed to medicinal plants could be used as an argument to support the conservation of biodiversity. However, such cultural values are not necessarily identical for wild and cultivated plants, and it is important to distinguish between cultural aspects concerning the use of the plants and cultural values regarding their cultivation. Moreover, the cultural values should not be perceived as being static (Cocks 2006). Our data demonstrate that as a consequence of the continued cultural use of medicinal plants by people who have migrated from their rural villages to (peri)urban areas, the trade in medicinal plants has increased. Local people have already responded by initial cultivation practices. Although some studies have indicated that African people in South Africa traditionally believe that cultivated medicinal plants 'lose power' (Prins 1996), this belief was not found to be strong in the study area and mostly concerned the use of *amayeza* for traditional ceremonies. Apparently the beliefs concerning cultural uses of the medicinal plants were more enduring than the traditional beliefs concerning their cultivation. The sustained belief in cultural use practices, also under non-traditional conditions, has resulted in an increase in commercial demands and a subsequent increased interest in cultivation.

Finally, this study shows that one should not be too optimistic about the scope of medicinal plant cultivation by poor people as a practical strategy for *in domo* conservation of threatened species. In the first place, preferred species for cultivation are not necessarily the most threatened species. In the second place, it is not clear whether such cultivation substitutes the collection of wild species or supplements it. This does not mean, however, that cultivation efforts should be disregarded as a conservation strategy. Rather than judging the impact of cultivation on its direct impact on conserving threatened species, its scope should be considered within a more general context of protecting and strengthening the cultural values of biodiversity and thus creating a positive attitude towards biodiversity conservation in general.

ACKNOWLEDGEMENTS

We gratefully thank Michel Postma, Jamie Pote, Nomtunzi Sizane, Mzwandile Gatya and Sibusiso Madikizela for their contributions to field data collection. The

research was funded by the Netherlands – South-African Programme on Alternatives in Development (SANPAD).

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