

Unsustainable collection and unfair trade? Uncovering and assessing assumptions regarding Central Himalayan medicinal plant conservation

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Abstract The trade in medicinal plants for herbal remedies is large and probably increasing. The trade has attracted the attention of scientists and development planners interested in the impact on plant populations and the potential to improve rural livelihoods through community based management and conservation. This has resulted in a large number of publications and development activities, ranging from small NGO projects to new government policies. Through a review of 119 references from Nepal, 4 common assumptions regarding the medicinal plant collection and trade have been identified: I. The commercial medicinal plant resource base is becoming ever more degraded as a consequence of collection; II. The medicinal plants are an open-access resource; III. Cultivation can contribute to conservation of commercially collected medicinal plant species; and IV. Medicinal plant harvesters are cheated by middlemen. The frequency of the assumptions is documented, their empirical support is evaluated, and the consequences of their presence for conservation and rural livelihoods are discussed. It is concluded that the empirical backing for the assumptions is weak, and that some reviewed references use logically flawed argumentation. It is argued that the assumptions are leading to misguided conservation efforts, and an inclusive approach to conservation of commercial central Himalayan medicinal plant species is briefly outlined.

Keywords Commercialization · Community-based conservation · Endangered species · Medicinal plants · Nepal · Non-timber forest products

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Introduction

Millions of people rely on, or choose to use, medicinal plants to cover all or part of their health care needs (IUCN 1993; WHO 2002). Tens of thousands of species are used, and medicinal usage may constitute the most common human use of biodiversity (Hamilton 2004). The annual world market for botanical medicines is estimated at USD 20–40 billion, with an annual growth rate of 10–20% (Kate and Laird 1999). Most medicinal plant species are harvested in the wild (Schippmann et al. 2002) and the extent of use, including the exchange of plant material across national borders and continents, has led to conservation concerns spurring recommendation of extensive cultivation programs (Akerele et al. 1991; IDRC 2002).

Medicinal plants are important to urban and rural populations throughout the Indian sub-continent (CSIR 1986). The traditional medical systems practiced in the region are dependent on input from a wide range of habitats and there is large-scale trade in medicinal plants. From Nepal alone, thousands of tons are annually harvested and exported (Olsen 2005, 2006), and the trade is known to have taken place for centuries (Regmi 1972; Olsen and Helles 1997b). Today, products from hundreds of species are gathered by rural harvesters in forests and other vegetation types, and pass through well-established market channels from remote Nepalese villages to cities in India (Olsen 1998). Quantitative end-use consumption estimates are not available for any products, but regional and international consumer demand for traditional plant-based medicines is argued to be increasing rapidly (Lambert et al. 1997; Hamilton 2004). In the past decades, trade has attracted the attention of scientists and development planners due to concerns over the impact of trade on plant populations and the potential for using trade to improve rural livelihoods through community based management and conservation (HMG 1988a). This has resulted in a large number of publications and development activities, ranging from small NGO projects to new government policies.

In our research and work with commercial medicinal plant conservation and trade in Nepal since 1992, we have had the opportunity to study the literature and interact with many policy makers, traders, and development agents. We have become increasingly aware that many of the actors in this sector, including scientists, government officials, and development workers, seem to implicitly operate with a number of major assumptions that influence their way of thinking and mode of action. Uncovering and discussing these assumptions is not just an academic exercise: the assumptions shape the public and academic discussions, and influence the use of scarce research funds and the formation of national and local decisions. Without an explicit discussion and assessment of the assumptions, the risk is that both conservation and development efforts in relation to commercial medicinal plants will be misguided. Through formulating and discussing what we perceive to be four unfounded assumptions, the present paper seeks to initiate a critical discussion of sustainable ways forward for commercial medicinal plant conservation.

Methodology

This literature review was conducted with the criteria for assessment of reviews of medical science in mind (Gates 2002). Though not directly comparable, issues such as selection and publication biases, as well as the formulation of a review protocol

are valuable. In contrast to reviews of medical science this review did not assess the quality of the included references; the only parameter noted was whether primary research had been carried out or not.

Literature was compiled from libraries, project offices, and government agencies. Criteria for inclusion were that references should include aspects of commercial medicinal plant conservation and/or trade in Nepal. Accordingly, e.g., purely ethnobotanical or pharmacological studies were not included. A total of 119 references dating from 1976 to 2004 were included in the review. There were contributions from 123 authors; the average number of references per author was 1.6 with a maximum of 7. The review included published but not peer-reviewed material (conference proceedings), unpublished material – e.g. consultancy reports, peer-reviewed material, policy documents, and journalistic material. An overview of reference types, main subjects addressed, and methods applied in the reviewed references is presented in Table 1.

This literature review does not claim to be exhaustive. Peer-reviewed material is relatively easy to find and access, while books containing non-peer-reviewed material and proceedings are often published regionally in small impressions. Consultancy reports usually have to be collected from the organisation commissioning it, and policy documents from the relevant ministry. The large number of non-peer-reviewed references included in the review were collected during periods in which the authors stayed in Nepal. If project offices were visited again more references could be added to the list, but the analysed literature probably includes all major opinions and views on medicinal plant conservation and trade in Nepal. Journalistic references were only included if they were frequently referred to in other publications. Only references in English were included; references in Nepali were only included if translated into English.

Careful reading of the literature resulted in the identification and formulation of four assumptions related to commercial medicinal plant conservation and trade. Identification of the assumptions was assisted by information gathered from informal and formal discussions and interviews held with researchers, NGO and donor staff, government officers, harvesters, and traders over the past ten years (Olsen 1995, 1998, 2006; Larsen 2002; Olsen and Larsen 2003). The identification and formulation

Table 1 An overview of types, main subjects addressed, and methods applied in reviewed references

Type	No.	Subject	No.	Method	No. ^a
Non-peer reviewed	60	General status	39	Interview	59
Unpublished	30	Sustainable management	12	Literature exclusively	33
Peer-reviewed	21	Trade analysis	12	Expert consultation	10
Policy document	6	Economic potential	12	Inventory	7
Journalistic	2	Resource assessment	9	Questionnaire	6
		Other	9	Not specified	6
		Conservation	7	Plant enumeration	5
		Government policy	6	Workshop	5
		Policy analysis	5	Cultivation trial	2
		Ethnobotany	3	Herbarium	1
		Biological study	3	Population biology	1
		Economic importance	2		
Total	119	Total	119	Total	135

^a Sums to 135 as some studies apply more than one method

of the four assumptions in this paper of course reflect the positions of the authors, and more assumptions could probably be formulated if other aspects than the state, management, and trade of medicinal plants were focused on. While the formulation of assumptions is necessarily a qualitative endeavour, their presence or absence from a given reference can be objectively verified, ensuring scientific rigour.

All references were categorized in terms of whether they featured or disagreed with one or more of the four assumptions. A database was constructed where the paragraphs featuring an assumption and the page number were entered. This was followed by a three-step analysis: (i) the prevalence of the identified assumptions was estimated by counting the frequency of occurrence among references, (ii) the degree to which each assumption is supported by empirical evidence was assessed, and (iii) when assumptions contain elements that cannot be assessed objectively, e.g. whether cultivation is likely to lead to conservation of wild populations, the provided arguments were analysed.

Results

Four assumptions were identified in the reviewed literature. Three assumptions are related to the state and management of the commercial medicinal plant resource base, while the last is related to trade. Information on the frequency of assumptions and the argumentation provided by the authors in the reviewed references are found in Tables 2 and 3.

Assumption I: degradation

The commercial medicinal plant resource base is becoming ever more degraded as a consequence of collection

In most of the studies reviewed, it is stated that the commercial medicinal plant resource base is being overexploited and degraded: “The main problems with the trade are that the resource is being depleted” (DeCoursey 1993, p. 51). A total of 25 different arguments and indicators supporting the assumption of overexploitation were found. The frequency of the three most common arguments (one reference may contain more than one argument) exceeds 50%. Fourteen references conclude that the present level of information renders impossible conclusions on whether the resource is degraded or not.

Assumption II: open-access

The medicinal plants are an open-access resource

Twenty-six studies state that the medicinal plant resource base is subject to open-access conditions: “Non-timber forest products, especially medicinal and aromatic

Table 2 Number of reviewed references featuring or disagreeing with the assumptions

Assumption	I. Degradation	II. Open-access	III. Cultivation	IV. Middleman
Featuring the assumption	77	26	48	37
Disagreeing with the assumption	3	10	3	5

Table 3 Most frequent arguments provided to support the four assumptions on medicinal plant collection and trade

Assumptions and arguments	No. of references
<i>Assumption I: The commercial medicinal plant resource base is becoming ever more degraded as a consequence of collection</i>	77
Collection is indiscriminate	51
Increasing demand for raw materials in India spurs unsustainable harvest	26
Poverty compels harvesters to destruction	15
<i>Assumption II: The medicinal plants are an open-access resource</i>	26
Previous systems disappeared due to nationalisation or increasing market demand	4
Monitoring is difficult	2
<i>Assumption III: Cultivation can contribute to conservation of commercially collected medicinal plant species</i>	48
Reduction of pressure on wild populations	17
Assurance of adequate supplies of raw materials for the industry	16
Provision of local benefits, e.g. income	10
<i>Assumption IV: Medicinal plant harvesters are cheated by middlemen</i>	37
Cash advances mean harvesters have to accept low prices	7
There are few traders	7
Lack of price information	6

plants, are regarded as a free commodity to be collected from nature” (Bhattarai 1997a, p. 82). Any systems in place to regulate collection are said to have disappeared after the Pasture Nationalisation Act in 1974, where traditional local rights to alpine pastures were transferred to the government (DeCoursey 1993). Ten references document some form of community management and/or argue that open-access cannot automatically be assumed. Hertog (1995, p. 24) observed both community management and open-access situations during a fieldtrip to Dolpa District: “Most of the valuable NTFPs are collected on public, government land, access to which is open to a group of villagers, Forest Users Group or all”.

Assumption III: cultivation

Cultivation can contribute to conservation of commercially collected medicinal plant species

Linked to the assumption of resource degradation is the assumption that cultivation can play a significant role in commercial medicinal plant conservation. This is expressed in 48 references across all reference types and major methods. Of these, 38 also feature the assumption of resource degradation. Assumptions I and II are related to what could theoretically be observed today (the state of the resource and absence or presence of local management systems), while Assumption III is related to a hypothesised future effect of cultivation.

Two possible drawbacks of cultivation are mentioned by three references: (i) promotion of cultivation on private land will not benefit farmers who cannot afford the necessary land, labour, and capital, and (ii) cultivation may not reduce collection from wild sources which may be carried out, in parallel, by a different sector of the community. In addition, concern over the content of chemical substances of cultivated plants is mentioned (Hertog 1995).

Assumption IV: middleman

Medicinal plant harvesters are cheated by middlemen

The fourth assumption is that the middlemen directing the dried medicinal plant products to India pay unreasonably low prices to harvesters, thereby earning more than what is considered fair: "...the mountain peasants who are the primary collectors are getting just the crumbs that fall from a sumptuous table" (Aryal 1993, p. 9). The assumption is expressed by 37 references. Five references argue that the middlemen are not exploiting the harvesters, but rather provide services such as transport and cash advances that would otherwise not be available. Four references do not state whether traders are exploitative, but note the services that traders provide.

There is general agreement that Terai based traders, the exporting central wholesalers, control market information and are able to capture very large profit margins. Some authors also state that village-based traders capture disproportionate margins.

Discussion

The four assumptions presented above can all be concluded relatively common on the basis of the number of references expressing them. In the following, they will be evaluated in terms of their empirical support, the line of argumentation used by their proponents, and the conservation consequences of their prevalence in scientific literature and policy documents.

Is the commercial medicinal plant resource base under threat from collection?

No explicit definition of degradation is provided in any of the reviewed sources, except Bhattarai et al. (2002). However, most references expressing the assumption of degradation refer to overexploitation (e.g. HMG 1988b) and species extinction (e.g. Chaudhary 1998). A narrow definition of degradation is used in this discussion: a significant and measurable decrease in the supply of medicinal plants.

The empirical basis for concluding that the commercial medicinal plant resource base is being degraded is very weak. Of the 77 references expressing the degradation assumption, 20 did so without any empirical support data, and another 29 studies were based on interviews only. Nor can the literature focusing on resource assessment be used to draw general conclusions. Of the 9 references related to resource assessment, three are literature studies discussing methods, two are reports of the National Forest Survey including presence–absence of a small number of medicinal plants in forest inventory plots, two are small-scale inventories based on purposeful sampling recording frequency and biomass, and two are small to medium-scale inventories based on random sampling recording frequency and biomass. Only two studies specifically attempted to evaluate the effect of commercial harvest on plant populations (Ghimire et al. 2002; Larsen 2002), but without data on general collection intensities these studies can offer little in terms of a general resource assessment.

A Conservation Assessment and Management Plan (CAMP) workshop conducted in 2001 assigned threat categories to 51 medicinal plant species using the

IUCN Red List criteria (Bhattarai et al. 2002). This exercise was essentially based on participants' perceptions of changes in various species parameters, such as population size. While useful, this should not be confused with, or equalled to, empirical evidence for the status of any medicinal plant species.

The assumption of degradation seems to a large extent based on beliefs that commercialization automatically translates into pressures on the resource (e.g. Shrestha and Joshi 1996). Though not explicitly stated, it seems that degradation is assumed to stem from increasing market demand leading to a break-down of local management systems because rising prices lead to indiscriminate harvest (levels and techniques) by poor, ignorant harvesters. The general belief that commercialization and increasing demand leads to overexploitation of natural resources is widely supported (Redford and Stearman 1993; Freese 1998), but so is the counterargument that the more valuable the resource, the stronger incentives people will have to manage it sustainably (Plotkin and Famolare 1992; Godoy and Bawa 1993).

Does commercialization lead to degradation of the medicinal plant resource base?

It is uncertain whether demand is increasing. However, there is supporting circumstantial evidence: Lambert et al. (1997) and Holley and Cherla (1998) claim increasing demand for natural medicines in western countries, while Olsen (1998) speculates that Indian demand is increasing. As the principal end-uses are not known for any species, predicting demand is impossible. While official trade data is very inaccurate (Malla et al. 1995), a 43% increase in district-wise annual average medicinal plant export from Nepal from the fiscal years 1989/90 to 2003/04 may indicate increasing demand for some species (Malla et al. 1995; HMG 2004). Longitudinal price information is almost completely absent. Olsen and Bhattarai (2000) found significant price increases for *Nardostachys grandiflora* from 1994/95 to 1997/98, but also that harvester prices were constant. This indicates that increasing demand and wholesaler prices do not necessarily directly affect the harvesters' incentive to collect. Furthermore, both common pool management and open-access regimes are found in Nepal, and evidence that the former are not robust and breaking down in the face of increasing market pressure is missing, as discussed below.

How common is open-access?

This review reveals confusion over the difference between open-access and common pool resources, e.g. 'Community pasturelands are considered as common property. As a result, there is no identifiable entity to accept management responsibility and most of the community pasturelands are overgrazed and deteriorating' (HMG 2002, p. 57). Equating open-access and community management means that exclusion of the harvesters from formal management decisions is a decision foregone. The confusion indicates an implicit adherence among the references to the Tragedy of the Commons line of thinking, where sustainable use of a common pool resource requires either management by the state or privatization (Hardin 1968). It also indicates that more than 15 years of research on collective action building on communication, trust, and reciprocity is disregarded. In this paper, we talk about open-access when no property rights define who can use a common pool resource and how uses are regulated (Dietz et al. 2002). Local institutions are documented to

hold the potential, under certain conditions, to keep common-pool resource extraction within sustainable levels (Ostrom 1990). These are, among other things, that the resource is considered valuable, that limits on access exist and can be enforced, and that co-operation is considered rational (Ostrom 1998). Furthermore, the presence of local institutions has been shown to have a positive effect on regulating harvesting practices, an effect argued to be more important than demographic changes (Agrawal and Yadama 1997).

Little emphasis has been placed specifically on studying local institutions in relation to commercial medicinal plants. Only 7 of the 26 references expressing the assumption on open-access were based on local level studies; none of these focused explicitly on local institutions. Eight references documented the presence of local institutions regulating access to, and withdrawal of, medicinal plants. Thus, local institutions for regulating commercial medicinal plant harvest are present in some, but not all locations, and open-access regimes cannot generally be assumed. This is not to say that local institutions ensure sustainable harvest. The local management systems documented in the reviewed references are both old (Larsen 2002), and newly arisen in the face of resource pressure (Edwards 1996b). The specific attributes of a given local system, including an assessment of the resource availability, need to be studied for an evaluation of the regulation potential.

Is cultivation a feasible conservation approach?

The need for cultivation has been voiced for decades (Dobremez 1976). As mentioned above, this is argued to lead to conservation of the wild plant populations, assured supply of raw materials to the industry, and local benefits. However, cultivation is rare. The Government of Nepal has established structures for growing and processing medicinal plants (Rajbhandary and Bajracharya 1994), but their focus is on exotic traditional species such as lemongrass rather than wild harvested and traded medicinal plant species. None of the traded species are commercially cultivated, though cultivation techniques are being developed for a few species (Maharjan 1994; Dhakal 2000). Likewise, medicinal plant cultivation in community forestry is rare as is cultivation on private land (Edwards 1996a). There are not yet any official reports of medicinal plants sold from community forests (HMG 2004).

Given the perceived benefits of, and official emphasis on cultivation, why is it so rare? Since no extensive official cultivation program has been initiated, it must be the assumption that market forces will induce individual farmers to cultivate medicinal plants. But seen from the farmers' perspective, cultivation apparently is not attractive. Several reasons can account for this: First, if there are relatively abundant resources, the unit cost of extraction will be low compared to cultivation. Second, the required investment may be too high in terms of land, labour, and/or knowledge acquisition. Third, other crops may be more profitable.

In the short term, collection of medicinal plants from the wild will continue whether the resource is declining or not: demand is likely to persist and other income-generating activities are unlikely to become available to any significant degree in the rural areas. Additionally, medicinal plant harvesters typically have less land, and will not engage in cultivation. Depending on the resource availability in the wild, cultivation may be seen at small scales. In the medium term, if demand persists, the availability of wild resources will depend on the ability of local systems to balance harvest and growth, at least for products of which harvest is necessarily

destructive. This may be tempered by new income-generating activities and a substitution away from extraction (Neumann and Hirsch 2000). If no substitutes are found, and the supply curve is assumed inelastic (Homma 1996), cultivation may eventually take place to a larger degree. Extraction and cultivation can probably take place simultaneously for some time, although the steady supply by cultivation would make prices fall (Homma 1996). Local benefit distribution effects would then depend on whether communal cultivation is initiated.

Thus, it appears that whether cultivation is initiated or not depends on the investment required by the individual farmer. This could to some degree be lowered through facilitating knowledge dissemination through NGOs, as is currently attempted (e.g. CECI 1998). However, cultivation will only substitute wild harvesting in the longer term when financially competitive, and may not serve to protect currently exploited plant populations. A more feasible approach to achieving conservation in the short term appears to be in situ management.

Is trade unfair to harvesters?

The large majority of references expressing the assumption on middlemen's exploitative behaviour provide no data on marketing margins. None of the references reviewed provide suggestions as to what a fair margin is. In the seven studies containing empirical estimates of marketing margins, 23% of Indian retail price (Malla et al. 1999), 9–37% of Terai seller's price (Hertog 1995; Sharma 1995), 7–27% of Indian wholesaler price (CECI 1999), and 12–54% of Indian wholesaler price (Rawal and Poudyal 1999) are perceived to be unfair. On the other hand, 50% of Indian retail price is considered fair (Edwards 1996b), as is 47% of Indian wholesaler price (Olsen 1998). The studies are not directly comparable due to differences in reporting net/gross benefits. The review revealed a need for more stringent price data collection and reporting: prices are published and quoted without specification of time (month and year) and location (physically as well as in the marketing chain). It has been documented that harvesters' margins for a species can change by 100% within the same season (Olsen and Helles 1997a), and that local traders can have negative margins in one year and positive in another (Olsen and Bhattarai 2000). This indicates that observations and recommendations based on data from just one year should be treated with much caution.

To assess whether harvesters of medicinal plants receive too low prices and returns to labour, three issues need consideration: (i) what should harvester prices be compared to, (ii) what are the returns to labour, and (iii) how does price share and return to labour compare with other products such as agricultural produce. Regarding the first, Olsen (2005) showed that almost 93% of the volume of commercial medicinal plants traded in 1997/98 went to India. As end uses and prices beyond the regional wholesaler level for all Nepalese medicinal plant species remain unknown, it seems reasonable to compare harvester prices with regional wholesaler prices in India. Regarding the second, there have been very few studies of return to labour used in commercial medicinal plant harvesting. In a study from western Nepal in 1994–95, Olsen (1998) found returns to labour input in dedicated medicinal plant harvesting comparable to other available income options. Regarding the third, Crawford (1997) calculated the gross percentage of the final retail price accruing to Nepalese farmers for rice and wheat at 56–69%. This is higher than the share of regional wholesaler price realized for medicinal plant harvesters. However, it is

difficult to compare the two figures, especially as farmers' costs are not known for the agricultural produce. In collection of medicinal plants in the wild, harvesters' gross and net margins will be almost similar as products can be collected free of charge and the activity does not require capital investments.

Thus available evidence does not indicate very low prices or returns to labour. Empirical data does not paint a clear picture of unfair harvester exploitation. This does not, of course, mean that income and/or return to labour cannot be increased.

Consequences of the assumptions

The four assumptions are common in the scientific, development, and policy communities working with commercial medicinal plants in Nepal. Empirical evidence on the state of the medicinal plant resource is not available, and yet perceptions of overexploitation and rural irresponsibility dominate the political agenda. The commonness of not-too-critical studies based entirely on literature means that assumptions get repeated and perpetuated. The perception of an impending ecological crisis in relation to the commercially harvested medicinal plants has led to strict rules on collection and export (HMG 1995), and harvesters are frequently regarded as ignorant or ruthless individuals incapable of organising for the management of a valuable common good. At the same time, the present authoritarian approach to commercial medicinal plant conservation and trade has led to widespread illegal rent-seeking (CECI 1999), while implementation of rules on resource monitoring are virtually non-existent (Larsen et al. 2005). This dire situation is further exacerbated by the attention given to cultivation. Many plans for domestication and cultivation of commercial medicinal plants have been made (HMG 1988a), but few have been implemented (HMG 2002). The cultivation focus is contributing to directing attention towards unknown future benefits, and away from the issue of sustainable collection from the wild today. It may thus be speculated that the eagerness to acknowledge degradation of the commercial medicinal plant resource base, on weak scientific grounds, has contributed to create a situation where real and possibly pressing conservation issues are not being identified or addressed. If the national objective of sustainable management of the commercial medicinal plant resource base (HMG 1988a) is to be achieved, a different approach to conservation is required.

An inclusive approach to conservation of commercial medicinal plants

The current top-down approach to commercial medicinal plant conservation emphasises control of harvesters and establishment of cultivation to relieve pressures on natural plant populations. As noted above, this approach has failed. We suggest an inclusive approach building on three key components: (i) scientific input, (ii) local communities, and (iii) regional co-operation. Consider these in turn. First, scientific input is required to establish a valid and reliable overview of conservation issues. Initial work should focus on conducting a national-level inventory for key commercial species as a basis for a species level empirical threat assessment. Much research and work has already been done that would provide input to and lower the cost of such an inventory, including identification of key commercial species (Olsen 2006), a GIS database with potential vegetation coverage (Lillesø et al. 2005) and reviews of NTFP inventory techniques (Wong et al. 2001). Subsequent research

could focus on increasing our meagre understanding of medicinal plant–people dynamics, e.g. how local communities respond to supply and demand changes. Second, conservation should build on involving local communities in resource management. Enforcement of official regulations is currently not possible, nor is any resource monitoring taking place (Larsen et al. 2005). Through involving local communities, several generations’ knowledge on medicinal plant ecology could potentially be used for location-specific management decisions. The need for the participation of local communities in in-situ conservation is increasingly recognised. If granted a share in management power and responsibility, local institutions could be part of adaptive co-management contributing traditional ecological knowledge and local institutions to an on-going process of trial-and-error (Berkes 2004). Third, Nepal and other countries in the region should strive to move from the current national conservation approach to a regional approach. Given the structure of the medicinal plant market, and the fact that almost all traded species are found across several countries, there is a risk that current national level regulations may simply, if implemented and enforced, shift demand and thus plant population pressure between countries.

Are assumptions found elsewhere?

The situation in Nepal resembles previous assumptions such as the ‘Himalayan environmental degradation theory’ (Forsyth 1998) and ‘west African deforestation’ (Fairhead and Leach 1995). These myths served to justify authoritarian policy interventions. In Nepal, there is a risk that harvesters of commercial medicinal plants will be announced culprits, responsible for the degradation of the medicinal plant resource base, just like the upland farmers of Nepal who were accused of causing erosion because they were said to cultivate ever steeper slopes without concern for lowland livelihoods (Forsyth 1998). A preliminary survey of 13 peer-reviewed studies related to commercial medicinal plant conservation and trade elsewhere indicates that some of the assumptions are also found in India and Pakistan (e.g. Sheikh et al. 2002; Uniyal et al. 2002). Assumptions of degradation and the potential of cultivation for conservation were common in the studies, while assumptions on open-access and middleman exploitation were found in Nepalese references mainly. Conclusions would have to include a thorough review of all types of references, as well as in-depth knowledge on local contexts, but the examined sources suggest that further investigations might be in place.

Conclusion

Four common assumptions on commercial medicinal plant conservation and trade in the central Himalaya were identified and formulated. The empirical support for the assumptions is weak and many arguments used to support the assumptions, such as the nature of the linkage between commercialisation and degradation of the medicinal plant resource base, are found to be accepted and used too uncritically. The need for additional empirical data to support conservation and development initiatives is evident. The present dominance of unfounded assumptions may be a barrier to identification of conservation priorities and may be diverting attention from development of in-situ adaptive co-management systems to ex-situ cultivation

issues. If sustainable management of commercial central Himalayan medicinal plants is to be achieved, future conservation efforts need to be based on scientifically valid data, build on community participation, and take place at the regional, rather than national, level.

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All 119 reviewed references from Nepal and 13 references from other countries in the region are included in the list although they are not cited in the text. Reviewed references are marked by an asterix.

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