

Stakeholder Perspectives on Use, Trade, and Conservation of Medicinal Plants in the Rasuwa District of Central Nepal

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Abstract: People's livelihood in several Himalayan regions largely depends on collection, use, and trade of medicinal plants. Traditional use is generally not a problem, but commercial gathering of selected species to meet increasing national and international demand can result in over-exploitation. Sustainable management of medicinal plants requires a clear understanding of the respective roles, responsibilities and viewpoints of the various stakeholders involved. Through personal interviews and group discussions, this study aimed at investigating the views of two stakeholder groups on use, trade and conservation of medicinal plants in the Rasuwa district of Nepal. Local people and district and national organizations agreed that medicinal plants are collected for a combination of commercial and personal uses. Perceptions on market availability differed significantly: 100 % of the respondents from district and national organizations saw markets as easily available, against only 36 % for local people. This could explain why medicinal plants were perceived by local people to contribute less to income generation than to livelihood improvement. Different viewpoints were also expressed concerning the status of medicinal plants in the district: 81 % of the respondents from district and national organizations

considered that medicinal plants were threatened, compared to only 28 % for local people. Despite this disparity, both stakeholder groups agreed upon potential threats to medicinal plants: over-harvesting; habitat loss due to land-use change and deforestation; and over-grazing by livestock. Several challenges were identified regarding sustainable management of medicinal plants, such as ambiguous policies; lack of resources, information and infrastructures; habitat degradation; and over-exploitation. Despite these challenges, respondents agreed that the medicinal plants sector offers huge opportunities in the Rasuwa district, given resource availability, community awareness and motivation, and the priority given to the sector by governments and other agencies. Proper collaboration, communication and coordination among stakeholders are needed to grab these opportunities.

Keywords: Medicinal plants; Livelihood improvement; Income generation; Himalaya; Local people; Conservation; Policy

Introduction

Among the many non-timber forest products (NTFPs), medicinal plants play a vital role in

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sustaining the livelihood of rural people in many countries around the world (e.g., Iwu 1993, Olsen 1998, Carvalho 2004, Samant et al. 2007, Uprety et al. 2010a). It is estimated that 70-80 % of the world's population relies on traditional herbal medicine, not only to meet primary health care needs, but also for income generation and livelihood improvement (Farnsworth and Soejarto 1991, WHO 2002, Larsen and Olsen 2007).

In Himalayan regions, people's livelihood is largely dependent on collection, use, and trade of medicinal plants (Larsen et al. 2000, Olsen and Larson 2003, Bista and Webb 2006). Many high-value Himalayan medicinal plant species are supplied from Nepal (Edwards 1996a), where approximately 25 % of the flora has been reported to be medicinal (Shrestha et al. 2001) and some 200 species are traded (Tiwari et al. 2004). Commercial trade of medicinal plants is of national economic importance in Himalayan countries (Olsen 2005), and lack of alternative livelihood activities has increased the pressure on medicinal plants (Bista and Webb 2006), resulting in growing concerns over their conservation and management (Hamilton 2004). Collection of medicinal plants for traditional use is generally not a problem, since this practice developed gradually and in harmony with natural ecosystems (Cunningham 1993, Ghimire et al. 2005). However, commercial gathering of selected species to meet increasing national and international market demand can result in over-exploitation (Cunningham 1993).

To achieve sustainable management of medicinal plants, it is crucial to identify the respective roles, responsibilities and viewpoints of the various stakeholders involved (Grimble and Chan 1995, Grimble and Wellard 1997). The medicinal plants sector involves various stakeholders, ranging from collectors to end users; local traders to exporters; traditional healers to professional practitioners; small formulators to industrial manufacturers; community-based organizations (CBOs) to national non-governmental organizations (NGOs) and government agencies (Larsen et al. 2000, Subedi 2001). All stakeholders can cause – or can be affected by – fluctuations in the medicinal plants sector, at varying degrees of scale, power and interest (Subedi 2001). Hence, it is challenging to integrate the interests of all stakeholders in a

sustainable, integrated management strategy (Saxena et al. 2001, Burger and Mayer 2003). In recent years, growing numbers of donors, development agencies and forest user groups have shown interest in promoting medicinal plant use for poverty alleviation (Banjade and Paudel 2008). Although several studies have already explored stakeholders' perspectives and participation in natural resource management (e.g., Grimble and Chan 1995, Kearney et al. 1999, Cheng and Mattor 2006), the few studies conducted in Nepal were mostly policy-oriented (e.g., Larsen et al. 2000, Larsen and Smith 2004). Studies are thus lacking in order to compare stakeholders' perspectives and participation in management initiatives.

This study aimed at comparing the views expressed by two stakeholder groups about the importance of medicinal plants for livelihood and income generation, as well as perceived threats to the conservation of medicinal plants. The study took place in the Rasuwa district of central Nepal and involved local people on the one hand, and district- and national-wide organizations on the other hand. Medicinal plants are crucial for local livelihood, but management policies and conservation programs are often elaborated and implemented by national, non-indigenous stakeholders. Comparing the viewpoints of local people and district and national organizations will help identify challenges and opportunities for sustainable, integrated management of medicinal plants.

1 Material and Methods

1.1 Study area

The study was carried out in three Village Development Committees (VDCs) of central Nepal: Chilime, Thuman and Gatlang, as well as in the district headquarters located in the Dhunche VDC (Figure 1). The Rasuwa district lies between 27°02' and 27°10' N and 84°45' and 85°88' E, with altitude ranging from 792 to 7245 m asl. The district is characterized by pronounced altitudinal gradients, coupled with complex topography and geology, resulting in a rich biodiversity and unique vegetation patchwork (Chaudhary 1998). Therefore, the district harbors a rich diversity of medicinal

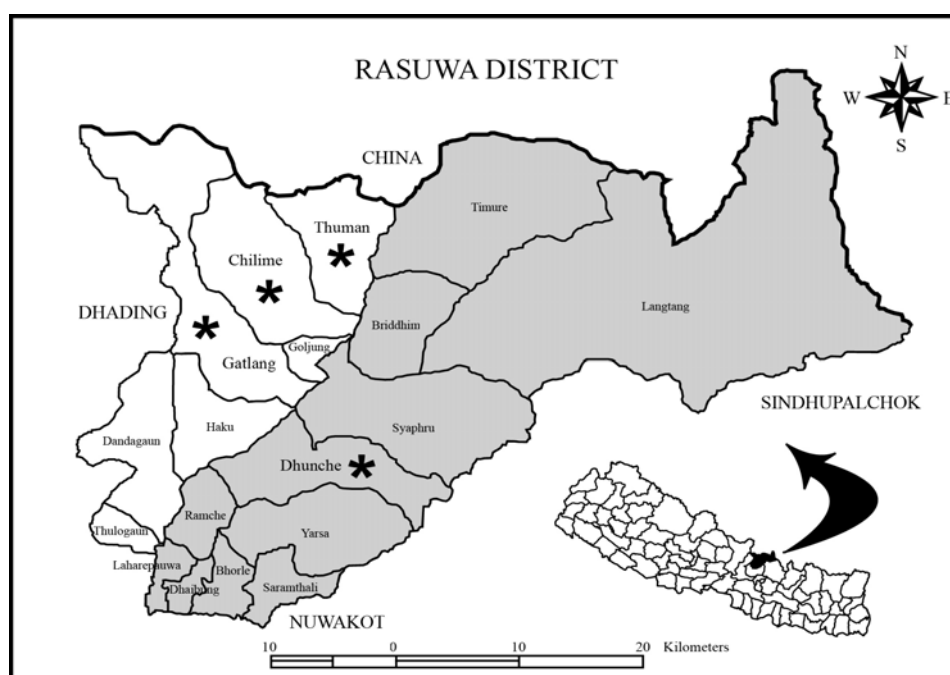


Figure 1 Location of the four studied Village Development Committees in the Rasuwa district of central Nepal (asterisks). The location of the Langtang National Park is also shown in grey.

Table 1 Land use pattern in the Rasuwa district (GoN 1998)

Land use	Area (ha)	Area (%)
Cultivated/Agriculture	11 640.78	7.7
Bush/shrub	8617.20	5.7
Forest	37 794.75	25.0
Glaciers	9070.74	6.0
Grass/pasture	17 234.40	11.4
Waste/barren	63 041.64	41.7
Rivers/water bodies	3779.47	2.5
Total land area	151 179	100

plants (Upreti et al. 2010a), some of which are protected inside the Langtang National Park covering 56 % of the district area (Figure 1).

The *Tamang* ethnic group accounts for 65 % of the population of the Rasuwa district. The proportion reaches more than 95 % in Chilime, Thuman and Gatlang VDCs (CBS 2003). People from the *Tamang* ethnic group have a rich culture and possess sound traditional knowledge. However, they are economically and socially marginalized and far from having their basic needs fulfilled despite their proximity to the Nation's capital.

Wastelands (barren) cover 41.7 % of the Rasuwa district (Table 1), and many community

forests have significant amounts of wastelands. Land suitable for agriculture only covers 7.7 % of the district (19.1 % if counting grasslands used for pasture), whereas forests and shrublands account for 30.7 % of the land base. Harvesting of medicinal plants in the wild puts high pressure on forests and shrublands. Since arable land is scarce in the Rasuwa district, people are seeking ways to add value to wastelands by using these areas for cultivation of medicinal plants.

1.2 Methods

1.2.1 Stakeholders identification

Two distinct groups of stakeholders were identified during the planning phase of research development, based on previous studies (Grimble and Chan 1995, Edward 1996b, Larsen et al. 2000, Larsen and Smith 2004): local people and district and national organizations.

1.2.1.1 Local people

This group comprised local people who collect medicinal plants for subsistence and who sale plants for income generation. Also part of this group were local traders who buy herbs from the local collectors for sale to road-side traders.

A total of 50 household heads (56 % male and 44 % female; 50 % > 40 years old) from the Chilime, Thuman and Gatlang VDCs participated in the study conducted in 2007 and 2008. Thirty one (62 %) of the respondents had no formal education, whereas nine (18 %) had primary school education, 6 (12 %) had secondary education and 4 (8 %) had university level education.

1.2.1.2 District and national organizations

This group comprised management- and development-oriented government authorities of the district (District Forest Office [DFO], Langtang National Park Office, District Agricultural Office [DAO], District Development Committee [DDC]), and national authorities responsible for policy formulation (Ministry of Forests and Soil Conservation, Department of Plant Resources, and Herbs and NTFP Coordination Committee). Also included in this group were conservation- and development-oriented NGOs and CBOs with an interest in medicinal plants (Ethnobotanical Society of Nepal, Manekor Society of Nepal, Community Forestry User Groups [CFUGs], district chapter of the Federation of Community Forestry Users, Nepal Agro-forestry Foundation, The Mountain Institute, and Poverty Alleviation Fund). University researchers conducting projects in the district dealing with traditional use, conservation and management, as well as genetic diversity of medicinal plants, were also part of this stakeholder group. Participants from district and national organizations (15 male and 6 female) were consulted in the district headquarters in the Dhunche VDC. They all had university education and forestry and social sciences backgrounds.

1.2.2 Data collection and analysis

Respondents from both groups were purposively selected based on their knowledge of medicinal plant use and management (Huntington 2000, Mbuvi and Boon 2009). Questionnaires and checklists for semi-directive interviews and discussion groups were developed to facilitate the collection of information (Martin 1995, Mbuvi and Boon 2009, Uprety et al. 2010a). The following aspects were covered by the questionnaires and checklists:

- perspectives on the use of medicinal plants;
- collection, trade systems, market

availability and contribution of medicinal plants to income generation and livelihood improvement for the local people;

- conservation and management issues and perspectives;
- perceived institutional and legal challenges and opportunities.

Two workshops were organized in the district headquarters to get together all stakeholders: one before the start of the project, and another at the end. The first workshop helped identify the major stakeholders, and the second allowed to corroborate the main results of the study. The collected data were coded and input as nominal and ordinal data into the Statistical Package for Social Sciences (SPSS version 17, 2009). Non-parametric tests of statistical significance – the Chi-square (X^2) and Kruskal Wallis (H) tests – were performed depending on the nature of the variables.

2 Results

2.1 Harvesting, use, trade and contribution to livelihood improvement and income generation

When asked if medicinal plant harvesting was more for personal or for commercial use, responses of local people ($N = 50$) and district and national organizations ($N = 21$) did not differ significantly ($X^2 = 0.183$, $df = 2$, $p = 0.912$), with both groups putting more emphasis on combined commercial and personal uses (Figure 2). There was a significant difference between the perceptions of local people and district and national organizations relating to market availability to trade medicinal plants from the Rasuwa district ($X^2 = 24.468$, $df = 3$, $p < 0.001$). While all respondents from district and national organizations mentioned that the market was easily available, this opinion was only shared by 36 % of the local indigenous people (Figure 3).

According to local people, medicinal plants contributed less to income generation than to livelihood improvement (Figure 4; $H = 37.384$, $df = 2$, $p < 0.001$). When viewed from a gender perspective, views of male and female participants on the contribution of medicinal plants to income

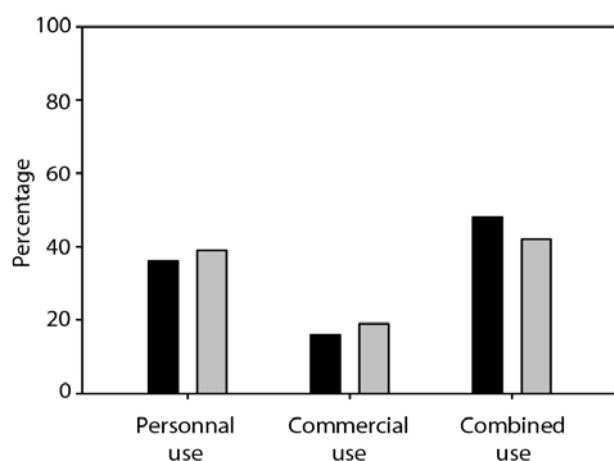


Figure 2 Percentage distribution of type of use of medicinal plants (personal, commercial, both) by local people (black bars) and by district and national organizations (grey bars)

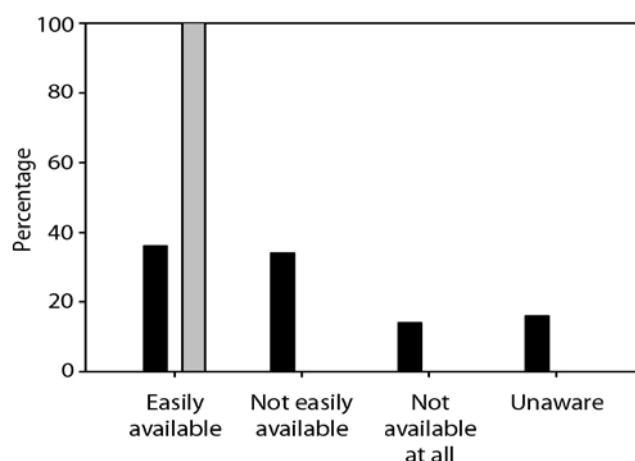


Figure 3 Percentage distribution of perceptions of local people (black bars) and district and national organizations (grey bars) regarding market availability of medicinal plants

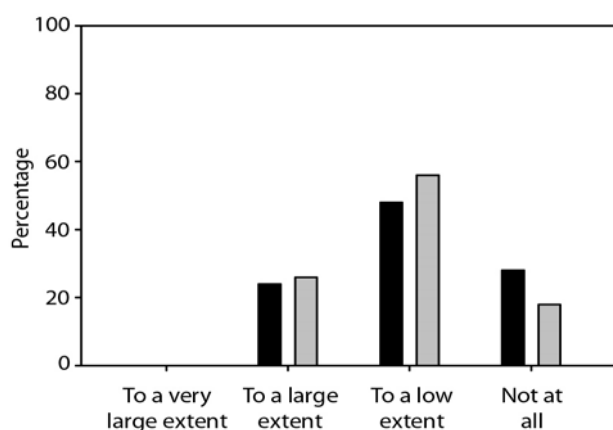


Figure 4 Percentage distribution of perceptions of local people regarding the contribution of medicinal plants to income generation (black bars) and livelihood improvement (grey bars)

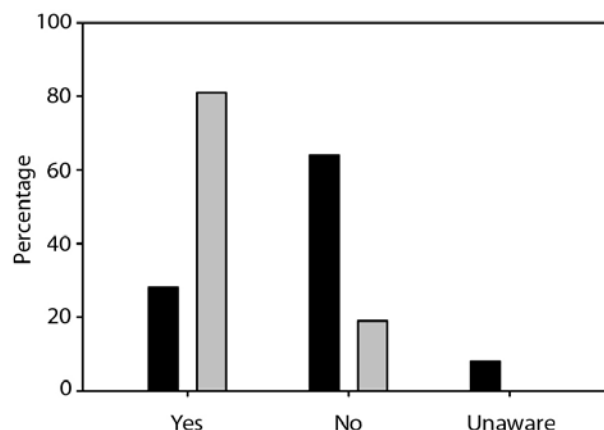


Figure 5 Percentage distribution of perceptions of local people (black bars) and district and national organizations (grey bars) regarding medicinal plants being threatened or not

generation ($H = 0.197$, $df = 1$, $p = 0.657$) and livelihood improvement ($H = 0.263$, $df = 1$, $p = 0.608$) did not differ significantly.

Local people who collected and used medicinal plants on a daily basis considered them essential to their livelihoods. Medicinal plants were used to treat most health problems, and 64 % of the respondents feared that their livelihoods would be affected to a large extent if medicinal plants became extinct. Only 10 % of the respondents thought their livelihood would not be affected if medicinal plants became extinct. For local traders, medicinal plants constituted a secure source of income. More local people would like to engage in the collection and trade of medicinal plants, but they lack knowledge of the supply chain, market

access, royalty rules, and collection permits needed. Some respondents mentioned that the existing traders controlled the market through an informal oligopoly. The traders themselves cited other problems, including subjective royalty rates, highly competitive market, low quality materials obtained from the collectors, and low volumes harvested. They added that value could be added to the raw material if technical know-how and financial aid were available.

2.2 Views on medicinal plants status and threats

Ninety percent of the local people and 86 % of the respondents from district and national

organizations believed that medicinal plants were abundantly available. However, the areas where medicinal plants are abundantly available were not all easily accessible. Almost 64 % of the local people thought that medicinal plants are not threatened (Figure 5) and therefore felt that CFUGs and DFO are imposing unnecessary regulations. Contrastingly, 81 % of the respondents from district and national organizations thought that medicinal plants are under threat (Figure 5). The difference between the two stakeholder groups' viewpoints was significant ($X^2 = 17.071$, $df = 2$, $p < 0.001$). Despite disparity in viewpoints concerning the level of threat to medicinal plants, local indigenous people and district and national organizations agreed about the potential threats to medicinal plants: over-harvesting, habitat loss due to land-use change and deforestation, over-grazing by livestock. Both stakeholder groups agreed that medicinal plants, although still widely available, were less abundant than they used to be and that declining resource availability and extinction of sensitive species might occur in the future if nothing is done to stop the trend.

Stakeholders from district and national organizations identified three major threats to medicinal plants. First, 42 % mentioned 'unsustainable harvesting practices' like collection of medicinal plants before they reach maturity, complete extraction of roots, tuber or rhizomes, and heavy looping of branches for collecting lichens, *Juniperus* fruits, and *Rhododendron* flowers for trade purposes. Second, the lack of an effective management system due to 'insufficient financial and human resources' was reported by 33 % of the respondents. Third, 25 % of the respondents identified 'deforestation and habitat loss' due to grazing, fuelwood collection and timber harvesting as a threat to medicinal plants in the district.

2.3 Perspectives on conservation and management approaches

The respondents were asked to choose among three possible conservation measures: habitat conservation, collection regulation, or education about conservation. Most stakeholders (55 % of the local people and 62 % of the district and national organizations) regarded education as the most

appropriate conservation measure. Local people equally valued habitat conservation and collection regulation (22.5 % in each case), whereas district and national organizations put more emphasis on habitat conservation (24 %) than on collection regulation (14 %). All stakeholders emphasized that local people and institutions like CFUGs require more capacity building programs to empower people and communities in inventory, scientific collection, and value addition, as well as to strengthen their institutions and support them in searching for markets.

A majority of respondents from both groups (52 %) affirmed that conservation of medicinal plants will require more collaboration and communication between local communities, DFO, national park authority and NGOs. Almost half (48 %) of the respondents from both groups mentioned that local communities should lead the conservation initiatives and activities. Some of the CFUGs blamed organizations working in the district for imposing irrelevant activities and duplicating programs. Participants had many stories of projects left unfinished, causing confusion and discouragement among local people. Many community groups formed for different projects and purposes ended without making any positive difference to the livelihood of local people. Some participants also blamed NGOs for poor timing of workshops and other activities that disturbed the agriculture schedule.

2.4 Challenges pertaining to sustainable management, use and trade

Stakeholders were asked to rank the four most important challenges pertaining to sustainable management, use and trade of medicinal plants in the district (Table 2). Because the perceived challenges were related to the nature of the participants' involvement in the medicinal plants sector, local collectors and traders were considered separately.

Eighty-two percent of the collectors having long-term interest in the medicinal plant sector mentioned lack of information about the market as the most important challenge. They felt that only a few of them possessed sound knowledge about the medicinal plants market and that these people did not share the information in order to keep the

Table 2 Summary of challenges pertaining to sustainable management, use and commercialization of medicinal plants

Rank*	Local collectors	Local traders	District and national organizations
1	Lack of market information.	Lack of infrastructure in the district for value addition and grading.	Limited species-specific information such as availability, distribution, productivity, regeneration potential, etc.
2	Inadequate supply of inputs and technical support for cultivation.	Ambiguous policies.	Declining resources availability due to over-exploitation, over-grazing and habitat loss.
3	Oligopoly maintained by a few local traders.	Illegal trade link with 'big mafia'.	Lack of resources for management and monitoring.
4	Depletion of the medicinal plants.	Lack of market information on prices, quality standards, required herbs and proper identification.	Ambiguous policies.

*1 = most important, 2 = important, 3 = fairly important, 4 = least important

market for themselves. Many people in the villages said they would like to cultivate medicinal plants, but could not because they were lacking technical know-how and did not have access to reproductive plant material. The 'oligopoly' maintained by local traders was also mentioned as an important challenge by the indigenous collectors. Collectors have to borrow money from the local traders during the off season for their household expenses. To get the loan, they have to agree to specific payback commitments through herb collection and they are thus forced to sell their herbs at the price fixed by the local traders. The slow decline of some medicinal plant species was also of concern to the local collectors (Table 2).

The main concern expressed by the local traders was the lack of infrastructure for value addition. They realized that processing of plant material for value addition is vital. Excessive bureaucracy from the DFO and ambiguous policies pertaining to the payment of royalties was another challenge experienced by the traders. They mentioned that all the paper work was burdensome, humiliating and discouraging and that multiple taxation and fixing of royalties were irrational. The traders were concerned about an 'illegal trade link with big mafia' that could potentially eliminate small scale trade from the business. Illegal traders encouraged unsustainable exploitation of medicinal plants by selling products collected in the national park, not following legal market routes, and often providing better prices to the collectors. Like the local collectors, the traders were challenged by the lack of information about market prices, quality standards, and about which herb

species are on demand and how to guaranty proper identification (Table 2).

For the district and national organizations, the lack of species-specific information such as availability, distribution, productivity and regeneration potential, was seen as the most important challenge. Also challenging was the declining availability of resources due to over-exploitation, over-grazing, and habitat destruction. Lack of resources for management and monitoring was also seen as a problem, as well as ambiguous policies imposed by the central government (Table 2).

2.5 Current conservation and management practices

A number of NGOs are implementing conservation and management programs in several VDCs of the Rasuwa district. They collaborate with the DFO, local communities, and local-based NGOs and CBOs. These organizations are implementing community participatory programs in resource assessment and mapping. They also provide assistance to CFUGs to include medicinal plants in their action plans and in their training and capacity building programs. Some of the best known activities and contributions by government offices, CBOs and NGOs are listed below.

- Foster the cultivation of *Swertia chirayita* (Roxb. ex Fleming) Karsten and *Valeriana jatamansii* Jones.
- Include conservation and management of medicinal plants in community forests operational plans.

- Provide training for community members about cultivation and sustainable harvesting in the wild.
- Develop capacity-building programs for resource assessment and monitoring.
- Conduct awareness campaigns on resource conservation.
- Give information to local people about conservation issues.
- Establish markets and resource information centers in the district.
- Prohibit illegal collection and trade (DFO at the district level and CFUGs at the local level).
- Help community members and DFO monitor forest resources.
- Impose a ban on collection of certain species according to the Forest Act of 1993.

2.6 Opportunities in the medicinal plants sector

All stakeholders indicated that the medicinal plants sector possesses huge opportunities for income generation, economic development and livelihood improvement if managed sustainably. The following were the main characteristics of the district mentioned as positive assets to the medicinal plants sector:

- Several Himalayan herbs available in abundance and highly valued on the market, including: *Aconitum spicatum* (Bruhl) Stapf, *Bergenia ciliata* (Haw.) Sternb., *Bistorta affinis* (D. Don) Greene, *Dactylorhiza hatagirea* (D. Don) Soo, *Ephedra gerardiana* Wall. ex Stapf, *Fritillaria cirrhosa* D. Don, *Hippophae salicifolia* D. Don, *H. tibetana* Schlecht, *Nardostachys grandiflora* DC., *Parmelia* spp., *Rheum australe* D. Don, *Rhodiola himalensis* (D. Don) S. H. Fu, *Rhododendron anthopogon* D. Don, *Swertia chirayita*, *Valeriana jatamansii*, and *Zanthoxylum armatum* DC..
- Growing community awareness, motivation, interest and participation in resource management and conservation, and NGOs and government interest in participatory programs.
- Capacity-building program for communities and local institutions.
- Existing processing possibilities.
- Policy to ensure stakeholders' participation, respect of indigenous knowledge and benefit sharing.

- High governmental priority given to the medicinal plants sector, notably through promotion of research and development.
- Establishment of a National Herbs and NTFP Coordination Committee.
- Species prioritization for cultivation by the Herbs and NTFP Coordination Committee.
- Inclusion of stakeholders' opinion in the policy review and fixing of royalties.
- Increasing interest for research on various aspects of medicinal plants such as species diversity, ecology, genetics, cultivation, harvesting modes, as well as identification of areas of interest for plant collection.

3 Discussion

3.1 Valuation of medicinal plants: local livelihood and trade

More than 50 % of the medicinal plant collectors were illiterate and activities related to medicinal plants were their only source of income. A similar situation was observed in Brazil by Carvalho (2004), who found that medicinal plants were still very important for low-income communities. The contribution of medicinal plants to health improvement, income generation, cultural identity and livelihood security for many people in rural areas makes these resources highly valuable. The results presented here show that medicinal plants contribute to income generation and livelihood improvement for the local people of the Rasuwa district of central Nepal, confirming results from a national survey (Olsen and Larsen 2003). However, results presented here add an important precision: the contribution of medicinal plants was less important for income generation than for livelihood improvement in the Rasuwa district. This could be explained by the fact that people from rural areas of the district were less informed about market possibilities. This is further reflected by the contrasting views of local people and district and national organizations regarding access to market. Local people were less informed about the medicinal plant supply chain and market possibilities, possibly because most of them were poor, illiterate and lived in remote areas. Only a few people possessed sound information about the

market and they monopolized the trade.

The view of district and national organizations that there is high market demand for medicinal plant species from the Rasuwa district is supported by an analysis of the domestic market (Tiwari et al. 2004). Local collectors and traders were concerned about lacking information about market, a problem already identified elsewhere (Brown 1992, Olsen and Helles 1997, Banjade and Paudel 2008, Uprety et al. 2010b). Effective marketing of NTFPs could help foster sustainable management by motivating collectors to adopt sustainable harvesting practices and by increasing the bargaining power of local people, helping them get better prices for their products (Lintu 1995, Karki 2003, Kunwar and Duwadee 2003).

3.2 Threats, conservation and management

The two stakeholder groups expressed opposing views regarding the status of medicinal plants in the Rasuwa district. On the one hand, and similarly to what was previously reported by Larsen and Smith (2004), district and national organizations perceived that medicinal plants were threatened (though not necessarily facing extinction in the short term), and felt that conservation strategies were needed alongside management. On the other hand, local people mentioned that medicinal plants were abundant and not threatened, calling for maximization of resource use. Many people living in the buffer zone surrounding Langtang National Park have been involved in the collection and trade of medicinal plants for many years. Increasing external market demand has encouraged local people to increase collection cadency, sometimes up to over-harvesting, thus threatening survival of some species. Collection of immature plants also increased, thus reducing overall resource availability (DFO pers. comm.). Over-harvesting of wild medicinal plants is widespread worldwide (Shrestha and Dhillon 2003, Hamilton 2004). Seeking to maximize profit, local people tend to over-harvest the highest value or most popular plant species, sometimes leading to extinction (Karki 2003). Forest destruction due to fuel wood collection, timber logging and grazing by livestock is likely to continue in the coming years in the

Rasuwa district, causing a severe reduction in the availability of medicinal plants. It is generally agreed that Nepalese alpine medicinal plants are threatened primarily by commercial collection and secondarily by habitat destruction (Shrestha and Joshi 1996, Chaudhary 1998, Shrestha and Jha 2009).

Many threatened species being traded are collected by plucking or digging whole plants, thus reducing regeneration potential. Such species include *Aconitum spicatum*, *Asparagus racemosus* Willd., *Bergenia ciliata*, *Dactylorhiza hatagirea*, *Ephedra gerardiana*, *Fritillaria cirrhosa*, *Nardostachys grandiflora*, *Neopicrorhiza scrophulariiflora* (Pennell) D.Y. Hong, *Paris polyphylla* Sm., *Rheum australe*, *Rubia manjith* Roxb. ex Fleming, *Swertia chirayita*, *S. multicaulis* D. Don and *Valeriana jatamansii* (Shrestha and Joshi 1996). There is also a sustainability concern over the complete removal of roots, which can have significant detrimental effects on plant survival and regeneration (Dhillon and Amundsen 2000, Ghimire et al. 2005). Although the collection and sale of some of these species are banned (GoN 1993), they still are collected and sold (legally or illegally) because the policies on these aspects are ambiguous, as mentioned by the stakeholders interviewed in this study. Exceptions are *Swertia chirayita* and *Valeriana jatamansii*, which are cultivated in the district. Both species are threatened due to over-harvesting (Shrestha and Joshi 1996, Shrestha 2007), and cultivation has been identified as the most effective solution for conservation of such species (Schippmann et al. 2002), helping relieve pressure on wild stocks.

The majority of the respondents emphasized the importance of effective collaboration and communication between stakeholders over plant use and conservation. Regular interactions and dialogue can open opportunities for local people, traders and government officials for maximizing benefit sharing of medicinal plant resources (Larsen and Smith 2004, Hamilton 2008). A collaborative planning process has also been shown to favour local people's participation in decision making (Cheng and Mattor 2006). Most local people believed that capacity building and conservation education programs could help regulate collection and make the communities aware of the benefits of habitat conservation. This

viewpoint was shared by government and NGO staffs. Communities were found highly motivated and willing to take part in management and conservation programs, suggesting joint efforts with other stakeholders. Many programs are being launched, including capacity building, awareness, information dissemination, and logistic support to the communities. Larson and Olsen (2007) stressed that community participation is an important factor to achieve sustainable management of medicinal plants. Indigenous people possess rich traditional ecological knowledge on habitat specificity and plant biology. Such knowledge and practices are important to consider in sustainable management of Himalayan medicinal plant resources (Ghimire et al. 2005).

3.3 Policy issues

The policy and regulatory environment for conservation and commercialization of medicinal plants has been criticized by the stakeholders as being ambiguous and ineffective (see Table 2), supporting previous findings (Chaudhary 2000, Larsen et al. 2000, Larsen et al. 2005, Olsen 2005, Banjade and Paudel 2008, Kunwar et al. 2009). However, contrary to these previous findings, the stakeholders interviewed in this study revealed that circumstances are changing, gaps are narrowed down and improvements are still foreseen, especially after the establishment of the Herbs and NTFP Coordination Committee and formulation of the 2004 Herbs and NTFPs Development Policy (GoN 2004). Recent revisions of the royalty collection and fixation system, ban lifting, and increased stakeholder participation in policy formulation confirm that progress is being made (Uprety and Poudel 2010).

Regulations are still based on a restrictive policy (GoN 1993). Collection, transport and sale of a few species are banned under the 1993 Forest Act. The primary motive of the government is to aid biodiversity conservation efforts, especially for the species under threat of extinction (Chaudhary 2000). However, these bans are not actually based on field evaluations of the state of resources (Larsen 2002). Policy making is rather generally based on stakeholders' perceptions (Larsen and Smith 2004). However, as revealed here, resources are lacking in the government sector for species-

specific studies on availability, distribution, productivity, etc. Restrictive regulations are generally not enforced, often by-passed, and are mostly perceived as sources of extra money for regulating authorities (Subedi 2001, Larsen et al. 2005). Illegal trade and smuggling are frequent and 'mafias' are successfully establishing, resulting in marginalization of local traders. Banjade and Paudel (2008) mentioned that, with respect to trading and exporting NTFPs, there are more hassles than incentives along the market chain. Hence, while external demand for medicinal plants rises, inequitable trade practices mean that only a small portion of the profits percolates to the local collectors (Karki 2003).

4 Conclusions

This study showed that medicinal plants are an important livelihood asset for the local people of the Rasuwa district of Nepal. However, despite the current situation offers huge opportunities, local people are still often deprived of economic benefits. Many of the issues identified referred directly or indirectly to policy formulation and implementation. Nevertheless, Nepal's forestry legislations are changing and are among the most progressive in the world (Larsen et al. 2005). Willingness of the local people to participate in conservation programs, government and NGOs recognition of medicinal plants as a priority sector, availability of large stocks of wild resources, suitable climatic conditions for cultivation, increasing market demand and promising policy support provide great opportunities for sustainable management of medicinal plants and livelihood improvement in this Himalayan district. Meanwhile, more effective collaboration, communication and coordination between stakeholders concerning use, trade and conservation of medicinal plants is required for securing sustainable development.

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