

Nepalese Non-timber Forest Products: An Analysis of the Equitability of Profit Distribution across a Supply Chain to India

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The collection and sale of non-timber forest products is a major source of livelihood in some regions of Nepal. The research reported in this paper compares the resource rent or contribution margin of collectors, village traders, Nepali wholesalers and Indian traders for two highly traded non-timber forest products of Nepal, namely asparagus and lichen. The causes of inequitable margins are investigated, and measures for increasing equity within the supply chain are identified. The research revealed that the margin of asparagus collectors was higher than for the lichen collectors, as lichen was subjected to the high transaction costs of illegal exports. Furthermore, collectors who stayed overnight in the forest during the collection period (overnight-stayers) to reduce travelling time had a higher margin than those who went home every day after collection (non-overnight-stayers). In four distinct trading chains analysed, Nepali wholesalers and Indian traders captured most of the resource rent. The difference in collection costs between overnight-stayers and non-overnight-stayers does not affect the margin of other stakeholders in the value chain. It was hypothesised that the inequity is exacerbated by a low level of understanding of marketing among collectors, and this is confirmed by survey results. It is argued that the margin of collectors could be increased by providing training, technical support, market and price information, and other forms of institutional support.

Keywords: lichen, asparagus, collection costs, unofficial costs, understanding level of collectors

INTRODUCTION

Nepal comprises 0.1% of the earth land area yet it ranks within the first quartile for global biodiversity importance (Biodiversity Profile Project 1995). This is because of its unique bio-geographic location, altitudinal variation and diverse climatic and topographic conditions. Out of 6500 flowering plants found in the country, more than 700 species are recognised as non-timber forest products¹ (NTFPs) and about 100 species of these are commonly traded (Biodiversity Profile Project 1995; Edwards 1996). Since processing capacity in Nepal is limited, a large quantity of NTFPs (10,000 - 15,000 tonnes per annum) is exported in raw form, mainly to India (Malla 1995). This is worth about US\$26.5 M a year (ANSAB 1998), approximately 4% of the national gross domestic product of Nepal (Kanel *et al.* 1999). A major policy document, the *Master Plan for Forestry Sector*, indicates a high priority for the Government to develop the sub-sector of medicinal plants and minor forest products, allocating US\$80 M for a period of 21 years from 1988-89 (MFSC 1989).

The policy on NTFPs forms a major plank of forest policy in developing countries because of their increasing contribution to employment, income generation, and also food security. For example, in India, about 7.5 M people are engaged part-time as collectors of *tendu* (*Diospyrous melanoxylon*) leaves and another 3 M process the leaves to *bidi* (Indian cigarette) (Mittelman *et al.* 1998). In the late 1980s, the annual export value of NTFPs was approximately US\$32 M in Thailand, US\$238 M in Indonesia, and more than US\$11 M in Malaysia (Beer and McDermott 1996). About 80% of the populations of developing countries use NTFPs to meet some of their health and nutritional needs (Beer and McDermott 1996).

NTFP trade in Nepal is analogous to a 'watershed' system in which many tributaries collect the runoff water from a large land area, which is poured into a stream and then many streams form the river and finally the river flows into the sea. In Nepalese NTFP trading, collectors are the tributaries, village traders the streams, national wholesalers and Indian traders are the river and Indian wholesalers (or commission agents) the sea from where re-branded NTFPs circulate in the different market centres after processing.

Collectors are usually poor people living in the hills and remote parts of the country. Because of geographical proximity and non-availability of other means of earning, their livelihood is depended on NTFPs (Maraseni 2002). They determine the primary management of NTFPs, and hence most directly determine the biological sustainability of NTFPs and the consequent impacts on ecosystem health. In particular, overexploitation has placed several high-value NTFPs – including *Nardostachys gradiflora*, *Rawolfia serpentina* and *valeriana jatamansi* – under a threat of extinction in Nepal (Edward 1996). The Master Plan for Forestry Sector, and Eighth, Ninth and Tenth Five-Year Plans in Nepal have emphasized the sustainable management of NTFPs (National Planning Commission 2002), which may be more effective if collectors received a higher *contribution margin* (CM).

¹ Definitions of NTFPs vary, but in Nepal fuelwood, fodder and timber are not regarded as NTFPs (MFSC 1988). More notably, the terms Minor Forest Products (MFPs), NTFPs, *Jaributi*, and Medicinal and Aromatic Plants (MAPs) are used interchangeably. For the purpose of this research, NTFPs refer to the traded parts of plants other than timber, fuelwood and fodder.

An improved understanding amongst collectors of the marketing, technical and regulatory aspects of the NTFP supply chains in which they work may improve both their own incomes and the sustainability of production. Knowledge of the market may lead to the asking of higher prices that can be borne by the market, while greater skills in technical aspects (such as phenology²) are vital for sustainable harvesting and biological sustainability. A sound understanding of the regulatory environment is crucial for legal security of collectors and also for sustainable harvesting (MFSC 1995). There are limited empirical research data available on levels of knowledge and on resource rent distribution within the supply chain, and whatever has been done so far is limited to Nepalese traders and market margin analyses. That does not account for the costs of collectors and therefore there has been little examination of the equity issue. This study has two key objectives, namely (a) to compare the resource rent shares of collectors, village traders, Nepali wholesalers and Indian traders, and (b) to analyze the understanding level of collectors in marketing, regulatory and technical aspects. On the basis of the findings of this study, some policy implications are noted.

THE STUDY LOCATION AND SCOPE

Four case study sites were selected for this study, these being the sites controlled by the Handikhola, Manohari, Daman and Gogane Village Development Committees (VDCs). These study sites are located in Makawanpur district, which is in the Narayani zone of the central region of Nepal. The elevation of the district ranges from 166 to 2586 m above sea level. This district was selected for two main reasons. Firstly, due to its diverse topography and high elevation range this district is enriched with diverse types of NTFPs. Secondly, NTFP trading from this district is relatively higher than from other similar districts due to its proximity to the Indian markets (Maraseni 2002).

The capital city of the district, Hetauda, is the nodal point of the Tribhuvan and Mahendra (East-West) Highways. The selected study areas comprising Handikhola and Manahari VDCs are located in the lower elevation zone (for asparagus) along the East-West Highway, while Gogane and Daman VDCs (for lichen) are located in the higher elevation zone along the Tribhuvan Highway (Figure 1). Altogether 825,000 kg, including 43 species of NTFPs, was traded from the Makawanpur district in the three years 1998 to 2001, generating more than 4.32 M Nepalese rupees (NR) revenue³ for the government (Maraseni and Shivakoti 2003). The highly traded NTFPs – lichen (97,817.3 kg) and asparagus (66,383.7 kg) – contributed more than 77% of the total revenue generated by NTFPs in the district. With the average selling price of 102.5 NR/kg for asparagus and 20 NR/kg for lichen, the asparagus and lichen collectors received more than 6.8 and 1.95 M NR per year respectively (Maraseni 2002).

² Phenology is the study of periodic biological phenomena, such as flowering and fruiting, in relation to climatic conditions, which is of utmost importance for sustainable harvesting and ecosystem health.

³ US\$1 = 77 Nepalese rupees (NR), as in April 2002.

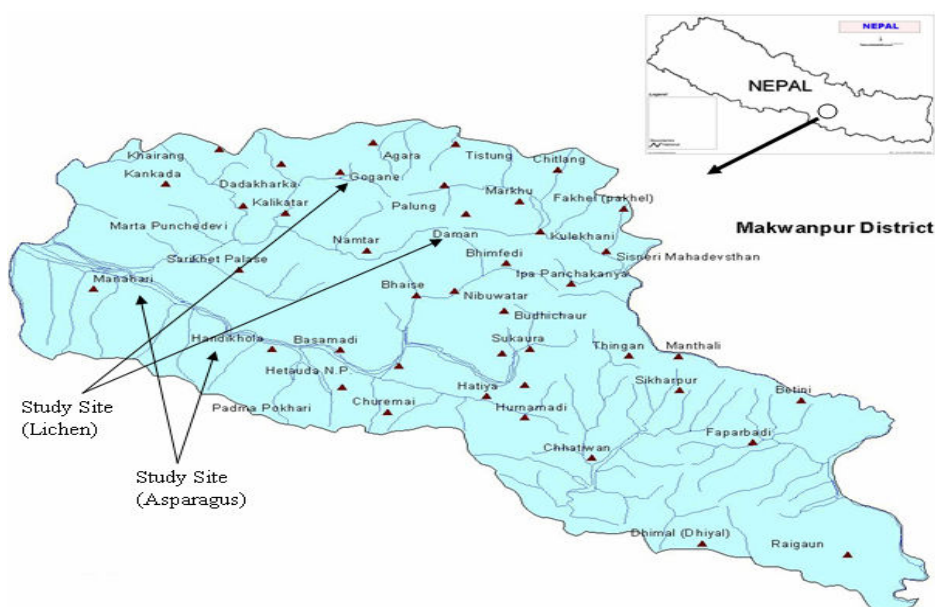


Figure 1. The four study sites of Makwanpur district, Nepal

Community forestry (CF) is the major forest management strategy in the middle hill region of Nepal. Currently, CF is gaining momentum in the research district, but the collection and trading of NTFPs are still limited to the state forests. Therefore, this research is focussed on the current NTFPs collection and trading practice from the state forest.

The research is based on an examination of the value chains for two highly traded NTFPs species, namely lichen species from high altitude areas and asparagus species from low altitude areas. Four species of asparagus (*Asparagus racemosus*, *A. gracilis*, *A. penicillatus* and *A. officinalis*) are found in Nepal (Department of Plant Resources 1995). The most traded species from the Makwanpur district is *A. racemosus*, which is found up to 1200 m elevation as a shrub under the forest of sal (*Shorea robusta*), asna (*Terminalia tomentosa*) and chir pine (*Pinus roxburghii*), and around that grass⁴. The main tradable part of asparagus is the tuber (root), which is used medicinally as a refrigerant, demulcent, diuretic, aphrodisiac, antispasmodic, anti-diarrhoeatic and anti-dysenteric (Kirtikar and Basu 1993).

Lichens are found in all types of habitats. They are complex dual organisms which contain a permanent association of a fungus or mycobiont and an alga or phycobiont. In Nepal, 465 species of lichens (2.3% of the world species) from 79 genera (19.7% of the world genera) have been recorded, of which 48 taxa are endemic (BPP 1995). Among them, *Parmelia nepalensis* and *P. Cirrhata* are the

⁴ This is a type of grass used for making roofs and walls of houses.

only traded species from the Makawanpur district. They are leafy plants and are mainly attached to the bark of *Pinus wallichiana*, *Quercus semicarpifolia*, *Barberis aristata*, *Schima wallichii* and *Rhododendron species*. They grow well in cool exposed areas where they are exposed to direct sunlight, and are most abundant in areas between altitudes of 1500 and 2586 m.

The Nepalese Government has banned the collection of some NTFPs and raw export of others under the *Forest Act 1993* and *Forest Regulation 1995*. The collection and export of raw asparagus is not banned. It can be exported directly to any part of India. Collection and in-country transportation of lichen in any form is also not banned, but the export of crude lichen is banned to prevent excessive and unsustainable harvesting. This provision is leading to a black market in Delhi, India, where it is sold for the preparation of scent fixatives, incense sticks and dyeing of woollen clothes.

RESEARCH METHOD

Sampling Design and Survey Method

A series of meetings with the forest officers, rangers, village traders and wholesalers was organised to identify the representative Village Development Committees, where the collection and trading of lichen and asparagus had been practiced for many years. After obtaining the names of collectors, the principal researcher spent at least two days at the homes of each village trader and another two days with long-time collectors in each site as a paying guest, and had an opportunity to observe their activities and obtain detailed explanations about the collection and sale of selected NTFPs. The target population for the research was all the collectors within the identified sites. The characteristics of randomly selected collectors were assessed and the subjects were generally homogenous in terms of income from NTFPs and level of understanding of marketing, regulatory and technical aspects. There were, however, minor differences between the forest overnight-stayers (OS) and non-overnight-stayers (NOS)⁵. On the basis of these differences, it was hypothesised that there would be differences in contribution margin and understanding levels between overnight-stayers and non-overnight-stayers.

Samples of 31 households in each VDC (124 in total, about 27% of total collectors' households) were judged to provide an adequate representation of the collectors and for the application of statistical tests. The collectors were divided into overnight-stayers and non-overnight-stayers, and stratified random sampling (SRS) with proportional allocation was adopted. Of the 124 sampled households, 45 (35 asparagus collectors plus 10 lichen collectors) were overnight-stayers and 79 (27 asparagus collectors plus 52 lichen collectors) were non-overnight-stayers. Each succeeding stakeholder involved in the supply chain was identified from the preceding stakeholder, and the links verified by participant observation⁶. The person

⁵ Overnight-stayers are those collectors who stay in the forest (typically for 2 to 23 days) during the collection time, while non-overnight-stayers return home every evening. However, both types of collectors collect NTFPs during the day time. Overnight-stayers have substantially lower transportation times than non-overnight-stayers.

⁶ Participant observation involved a range of activities including staying, talking and eating with the various stakeholders in the value chain, in their own setting.

in the household most directly involved in the collection and trading activity was interviewed face-to-face. Personal interviews were also conducted with village traders, Makawanpur wholesalers and Indian traders. Two commission agents in Delhi (India) were contacted by telephone for price information. All trading activities from the collectors to the selling of NTFPs to the Indian traders were observed. Finally, a two-day district-level workshop was organised with the participation of forest officers, rangers, district committee members, village committee chairpersons, collectors, middlemen, wholesalers and NTFPs planters. The workshop verified the data from fieldwork, which was then processed and analysed with the use of SPSS and Excel, generating inferential statistics.

Estimation of Understanding Index (UI) of the Understanding Level of Collectors

During interviews, collectors were questioned about their levels of understanding of regulatory, technical and marketing aspects of the two selected NTFPs, using Likert scale questions. Based on a discussion with forest experts, 14 factors were considered under these three aspects⁷, for deriving the Understanding Index values (or Weighted Average Index values). Initially, five understanding levels were specified; very high, high, moderate, low and very low, but this was reduced to four after focus group discussions indicated that no collectors had a 'very high' level of understanding. Each respondent was allowed to tick only one understanding level. When entering the data into SPSS, scale values were used, for example, 1.0, 0.75, 0.5 and 0.25 for 'high', 'moderate', 'low' and 'very low' understanding levels, respectively, following Shahi (2000), Maraseni (2002) and Pandit (2002). The Understanding Index (UI) was calculated as:

$$UI = \frac{\sum p_i f_i}{N}$$

where p_i = scale value for i^{th} understanding level⁸
 f_i = frequency of respondents with understanding level i , and
 $N = \sum f_i$ = total number of respondents.

After estimating the understanding index (UI), the average of the understanding index (AUI) of each aspect was estimated as:

$$AUI = \frac{\sum UI_i f_i}{N}$$

⁷ The 14 factors are as follows: Regulatory aspect: collection permit, agreement rules, harvesting rules, transportation rules, export rules, band species for the collection and unprocessed export, revenue and tax; Marketing aspect: selling price of buyers, processing of the products, final destination of the products, final uses and users of the products; and Technical aspect: phenology, distribution and growing stock of the species.

⁸ For example, if 50 respondents' understanding level is low, then the scaling value (p_i) is 0.5 and the frequency (f_i) is 50.

where UI_i is the understanding index of the i^{th} category (this may be an overnight-stayer or non-overnight-stayer), f_i is the number of respondents in i^{th} category and N is total number of respondents ($N = 124$).

Estimation of Costs for the Various Stakeholder Groups

Costs were estimated for each stakeholder group. For primary collectors, the collection costs cover equipment and labour costs. The general wage rates of males and females for farm activities were taken as the labour opportunity cost, even though farm work may not be available for all the time of NTFP collection. Since there was a large difference in farm wage rates between males and females, separate wage rates were applied. For lichen areas, the average wage rates (per day) of men and women were 90 NR and 70 NR, whereas in asparagus areas the rates were 80 NR and 60 NR, respectively. Male and female person days involved in collection, transportation, local processing and selling and the respective wage rates were estimated. Similarly, the percentage of time the harvesting instruments were used for NTFP-related work and their lifetime were considered to estimate the equipment cost for the total quantity collected. Collection cost was estimated as:

$$\text{Collection cost} = \frac{\text{Total mandays involved} \times \text{wage rate} + \text{equipment cost}}{\text{Total quantity sold}}$$

Costs of other stakeholders include royalty, various types of taxes, unofficial costs, storage costs, transportation costs and weight loss. Some costs are not applicable to some stakeholders. Since collectors and agents do not require NPFT collection permit, they do not pay royalty; this was paid by village traders, who were required to obtain collection permit. Part of the other costs (taxes, unofficial costs, storage costs, transport costs and weight lost costs) was borne by village traders, Makawapur wholesalers and Indian traders in different space and time. Since the Indian wholesalers sell NTFPs directly to Indian processors or exporters while taking 6.5% commission on the selling price, their storage cost (a negligible amount) was not estimated. The cost plus the buying price minus selling price for each stakeholder is the estimated contribution margin (NR/kg) for that stakeholder.

RESULTS AND DISCUSSION

Socioeconomic Overview of Collectors

The average per-capita landholding of the collectors was low (0.055 ha) relative to the national average (0.176 ha). More than 82% and 15% of the collectors belonged to *Tamang* and *Chepangs* castes (suppressed castes) respectively, whereas their representation within the total district population was only around 48% and 4% respectively. The average household income of collectors (16,833 NR) was one sixth of the national average. About 20% of the collectors did not produce crops and thus had a shortage of food for the whole year while 87% of collectors suffered food shortages for at least six months of the year. Therefore, the income from NTFPs is critical to their livelihood. The literacy rate of collectors (40%) was lower than the

national average (54%). There was a large difference in wage rates between the genders. NTFPs contributed about 45% of the total income of the collectors.

Stakeholders in Supply Chain

On average each household in the study area had 1.95 collectors (about 35% of the household size), and the majority of collectors were male and over 16 years of age. NTFPs are purchased from them by village traders (or their agents) and sold on to Makawanpur wholesalers. There were three village traders for both asparagus and lichen in the study areas, and two Makawanpur wholesalers in the district, both of whom have purchased NTFPs from over 14 districts for more than 20 years. Indian traders purchase NTFPs from the Makawanpur wholesalers and sell them to Indian commission agents (wholesalers) (Figure 2).

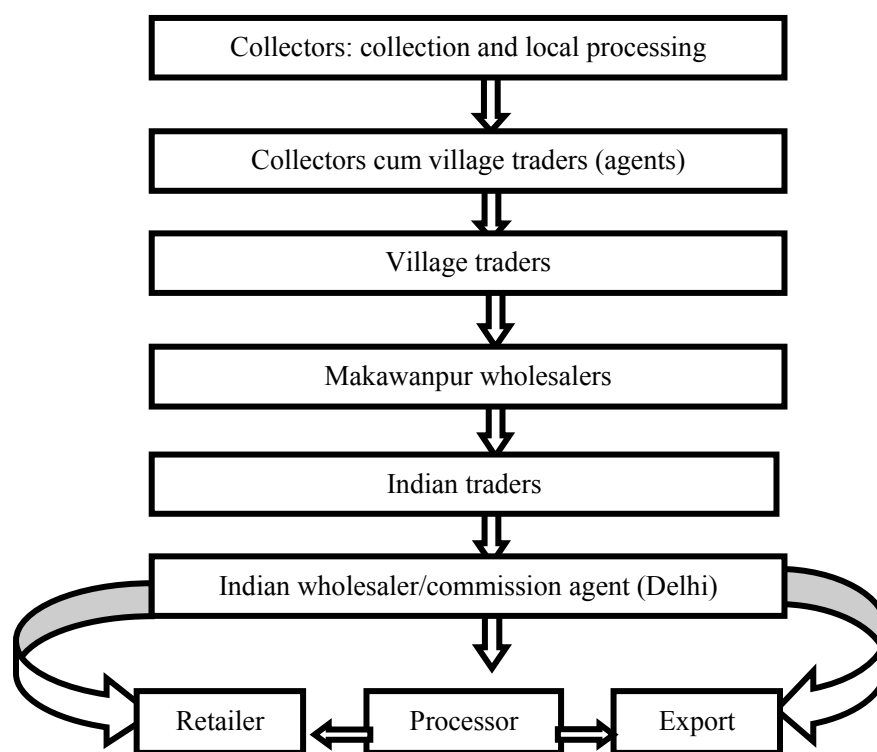


Figure 2. Current marketing chain of asparagus and lichen

Analysis of Cost of Asparagus and Lichen Trading

The average collection costs of overnight-stayer and non-overnight-stayer asparagus collectors were estimated as 35.35 and 51.50 NR/kg respectively. The average selling price of the OS and NOS asparagus collectors were 95 NR and 110 NR/kg respectively. The selling price of OS is lower because they use fire-drying which results in low quality, black coloured tubers, whereas NOS use sun-drying and produce high quality, cream-coloured tubers. For lichen, the collection costs of OS

and NOS were 10.04 and 25.5 NR/kg respectively, and the average selling price for both groups was 23.5 NR/kg. The lower collection cost of OS was due to rich sources of both NTFPs because they always stayed in undisturbed forest areas, where greater quantities are available. More importantly, they had considerably lower transportation time and invested that time in collection. The estimated costs (other than collection costs) associated with the NTFP trade are summarised in Table 1, and discussed below.

Table 1. Costs associated with lichen and asparagus trade borne by the various stakeholders (NR/kg)

NTFP type	Royalty	Tax	Unofficial cost	Storage cost	Transport cost	Weight loss cost	Total cost
Lichen	10	1.87	18.96	1.48	3.7	5.23	41.24
Asparagus	2	0.60	5.85	0.8	3.7	4.09	17.04

There were some inconsistencies in the application of royalties. In Nepal, *royalty* is the rent paid to the government for extraction of products from state-owned forests (Kanel 1999). The Nepalese Government fixes the royalty rate of each NTFP and rates are published in forest regulations. As per the *Forest Regulation 1995*, the royalty rates for lichen and asparagus were 10 and 2 NR/kg, respectively. The survey found that the final prices of lichen and asparagus in Delhi were 97.5 and 238 NR/kg respectively, indicating that the royalty is set on an ad hoc basis, not related to either the degree of scarcity or the market price of the NTFP. According to the *Local Governance Act 1999*, traders should pay 90% of the royalty to the District Forest Office (DFO) and 10% to the District Development Committee (DDC). Instead, they have been paying 10% of the prescribed royalty to the DDC and 100% to the DFO. In addition, the DDC charges 0.25 NR/kg as the octroi tax⁹ through a contractor, which was not mandated by the *Local Governance Act 1999*. An inconsistency exists between policies and practices, and different agencies are not working collaboratively, indicating a need for better coordination and clearer procedures.

There are a number of DDCs, VDCs, police and forest check-posts in the transportation routes, where the traders are required to pay various types of taxes. In the case of lichen, the VDC and the Forest User Group charge 2000 NR per trip (i.e. per load of 4000 kg) and 500 NR per trip respectively¹⁰. The customs office imposes an export tax of 0.5% of the border site prices of NTFPs; however, this was not applicable to lichen, because they were being exported illegally.

The unofficial costs are those which are not legally defined, including the cost of carrier charge to export illegally across the Indo-Nepal border area. Unofficial costs of lichen and asparagus were found to average 1.9 and 2.9 times their respective royalties (equivalent to 80.7% and 5.7% of the respective selling price, or 46% and

⁹ Called *Chungi Kar* in Nepali, this is the tax which is paid to the local government (here DDC) for permission to transport goods from one district to another.

¹⁰ According to the *Forest Regulation (1995)*, the Community Forest User Group is an autonomous corporate body. If the NTFP was collected from the community forest by the users, they may have had different payment arrangements. However, they are not entitled to pay royalty to the government.

34.3% of the respective total costs). Traders had to pay 500 NR to the carrier per single 50 kg pack of lichen to cross the Indo-Nepal border¹¹. The Makawanpur wholesalers and Indian traders incur all these unofficial costs. However, directly or indirectly they pass this cost on to collectors. As a result, the lichen collectors received a lower percentage (24.1%) of the final price compared to asparagus collectors (43%). The storage costs cover the costs of NTFP storehouses by all stakeholders in the value chain. The storage cost of lichen is higher than for asparagus because it is an illegal item and cannot be exported directly. Sellers have to store the products for few days while waiting for favourable conditions to cross the Indo-Nepal border. In principle, the transportation cost of lichen should be higher than for asparagus due to the greater distance and hilly terrain but since this is the route of empty trucks to the district capital the charges are nominal. Because lichen is fresh at the time of purchase from collectors, a greater cost due to weight loss arises for lichen during transportation from Nepal to India, compared to asparagus which is sold as a dried product.

Contribution Margins Analysis of the Various Stakeholders

In the case of lichen, although the selling price was the same for both types of collectors, the contribution margin¹² of overnight-stayers (13.5 NR/kg) was higher than for non-overnight-stayers (-2.1 NR/kg), due to their lower collection cost (Table 2). NOS spent considerable time travelling to and from collection sites. The total margin of the supply chain starting with NOS lichen collectors was 29.9 NR/kg while the collectors had a negative margin. Village traders and agents also received a lower margin. However, the Makawanpur wholesalers and Indian traders alone obtained a margin of more than 76%, and another 21% was obtained by commission agents. This situation indicates that the collectors and village traders do not receive an equitable share of resource rents due mainly to their weak bargaining power.

The supply chain commencing with OS is satisfactory in terms of the collectors' share of resource rent. However, more interestingly, in both types of supply chain for lichen, the margin for all lichen trading partners except the collectors is the same. Therefore, it is clear that the OS are making relatively equitable margins because of their low collection costs, not because of their bargaining power, collective action and risk-bearing capacity.

In the case of asparagus, the margins of OS and NOS are similar. The production cost for NOS is higher than for OS but the latter also receive a lower price because their tuber quality is lower. Both types of collectors had a margin of more than 30%. Compared to the lichen business, the asparagus business seems more profitable to all stakeholders. However, the average collectors' selling prices of lichen and asparagus are only about 24% and 46% of their respective wholesaler price. An analysis of all four supply chains shows that, in totality, collectors are receiving only about 30% of total resource rent, whereas Makawanpur wholesalers and Indian traders capture about 46% and commission agents more than 10%. If the collectors had direct access to Makawanpur wholesalers, they could increase their margins by 13%.

¹¹ Similar arrangements exist for the illegal export of *Jatamanshi* and *Sugandhawal* (CBED 1999).

¹² The estimated contribution margins are based on the opportunity costs of labour, taken as the average wage rate of labourers. However, paid jobs are not always available, which is why people collect lichen when the margin (with allowance for labour) is negative. Placing a zero opportunity cost on labour would increase the estimated margin substantially.

However, the collection permit system precludes this since the permit from the District Forest Office is usually obtained by either the Makawanpur wholesaler or village trader.

Table 2. Collection costs, selling price and contribution margins (NR/kg)^a

Collector designation	Collection cost	Selling price of collector	PM of collector	PM of agent	PM of VT	PM of MH	PM of IT	PM of CA	Total CM
OS (lichen)	10.04	23.5	13.5 (29.6)	2.0 (4.4)	0.7 (1.6)	10.6 (23.3)	12.3 (27.1)	6.3 (13.2)	45.5 (100)
NOS (lichen)	25.59	23.5	-2.1 (-7.0)	2.0 (6.7)	0.7 (2.5)	10.6 (35.4)	12.3 (41.3)	6.3 (21.2)	29.9 (100)
OS (asparagus)	35.35	95	59.7 (32.1)	NA	24.5 (13.2)	42.9 (23.1)	43.1 (23.1)	15.5 (8.3)	185.6 (100)
NOS (asparagus)	51.50	110	58.6 (34.6)	NA	29.5 (17.4)	22.9 (13.5)	43.1 (25.4)	15.5 (9.1)	169.5 (100)
Total			129.6 (30.1)	4.0 (0.9)	55.4 (12.9)	87.0 (20.2)	110.9 (25.8)	43.6 (10.1)	

^a VT stands for village traders, MH for Makawanpur wholesalers, IT for Indian traders, and CA for commission agent. Figures in parenthesis are percentages of the total CM across all stakeholders.

From the analysis, it is clear that the NTFP market of the Makawanpur district is monopolized by Makawanpur wholesalers and Indian traders. The main problem has been that there are only two wholesalers in the district, and therefore competition is almost not-existent. The reasons for the small number of buyers could include the high capital cost of purchasing stock and acclimatization into a new business (Olsen 1999). In the study sites, the major reason for lack of competition is the close relationship between wholesalers and Indian traders and local authorities; new entrants would have difficulty competing against such effective networking. There is one 'unauthorised cooperative' of six village traders and wholesalers in the Makawanpur district. The main objective of this cooperative is to maintain harmonious relationships between traders and wholesalers. Through this cooperative, they maintain a fixed price of NTFPs in the district¹³. However, they had marginally increased the price of asparagus and lichen because these species are the main concern of many collectors. The price is usually fixed at the beginning of each collection period, and once fixed remains constant for that year.

Conditions in Which the Collectors' Price of NTFPs Can be Increased

A number of strategies could be used to increase the contribution margin of collectors within the supply chains. The following discussion is based on the suggestions of village traders and Makawanpur wholesalers. Since the export of lichen to India in crude form is illegal, the Makawanpur wholesalers and Indian

¹³ The market centre price of some NTFPs, including *Kumkum pat* and *Tayeri* which have few collectors, has been constant for more than three years.

traders are bearing a huge amount of unofficial export costs¹⁴. Because of this practice, the Customs Office of the Nepalese government misses out on the 0.5% export tax (on the border price of lichen), and a large amount of money is paid to the carrier to cross the Indo-Nepal border illegally. If the ban on lichen were lifted, the traders stated that they would be prepared to pay about 8 NR/kg more to lichen collectors.

NTFPs traders stated that they could not obtain loans to expand their businesses and achieve economies of scale because there are no banking services for this particular purpose. The Agricultural Development Bank is responsible for the banking services, but the bank staff said 'we do not know the market price and name of the products. The market is insecure with potential fluctuations in prices likely to affect profits'. One solution could be that the bankers take the average price for the last three to five years and provide loans based on not more than say 50% of this average price. With such a finance facility, traders stated they would be prepared to increase the price by 1 NR/kg to collectors of both NTFPs.

The system of checking by installing checkpoints throughout the transportation route also adds to the costs. The verification of transit permits starts from the loading of NTFPs and continues from each Area Forest Office and checkpoint on the route. Transporters (traders) also have to stop at each police and District Development Committee checkpoint, where they have to show both the collection permit and transport permit. The traders would prefer sealed transportation systems, with products and permits verified only in two places, namely the first check and sealing at the time of loading, and the second check at the customs office or storage place. If this system were in place, the traders said that they would be ready to increase the price by 0.5 NR/kg to collectors of both NTFPs. There was no cold storage facility in the district, sometimes forcing Nepalese traders to sell their products to the Indian traders at lower prices because of the need to sell them off as soon as they are harvested. They were demanding at least one cold store in the district. If that was provided, traders were willing to pay an extra 2 NR/kg to the collectors of asparagus. If lichen collectors could provide high quality products such as large flowers, free from inert materials, traders were happy to increase the price by 1.5 NR/kg. Similarly, they offered to increase the price paid for asparagus by 2 NR/kg if collectors could provide large, whitish and tailless tubers.

While talking with collectors about these conditions for higher payments, some differences of opinions became apparent. Some collectors claimed that they often sold high quality products but did not receive a high price. However, most of these conditions (for example, the ban on crude export of lichen, multiple checkpoints, cold storage and banking facilities) were recognised by authorities and collectors. Analyzing the current situation, it seems that whatever problems (and costs) exist in the supply chain, ultimately the burden is shouldered primarily by collectors. Since collectors do not have a cooperative marketing organisation and lack market information, they lack bargaining power.

¹⁴ The collectors did not pay these costs directly because these costs were incurred after they sold their NTFPs.

Analysis of Understanding Level of Collectors

A high level of understanding among collectors of the marketing, technical and regulatory aspects may contribute to the sustainability of the NTFP business. The survey revealed that the level of understanding of such aspects is 'low', followed by 'very low' and 'moderate'. The Weighted Average Understanding Index value also indicates that their average understanding level is 'low' (Table 3). It was revealed that the collectors spend most of their time in the forest or in the agricultural field. Neither the collection permit holders (either village traders or wholesalers) nor the forestry personnel teach them about marketing or technical and legal aspects. In some cases, collectors were scared to talk with authorities, because they thought they had been involved in illegal activities.

Table 3. Understanding levels, in terms of Understanding Index (UI) and Weighted Average of UI (AUI) of NTFP collectors

Types of NTFP	Night halt in the forest	Regulatory aspect ^a	Marketing aspect ^b	Technical aspect ^c
Asparagus collectors	Yes (n = 35)	0.3990	0.4043	0.7536
	No (n = 27)	0.5939	0.5833	0.6898
Lichen collectors	Yes (n = 10)	0.2857	0.3300	0.2500
	No (n = 52)	0.4979	0.4615	0.3822
AUI (n = 124)		0.4738	0.4613	0.5433

Asparagus collectors: a Significant difference between the halters types (F = 54.79, $p \leq 0.05$)

b Significant difference between the halters types (F = 42.37, $p \leq 0.05$)

c Significant difference between the halters types (F = 3.32, $p \leq 0.075$)

Lichen collectors: a Significant difference between the halters types (F = 24.4, $p \leq 0.05$)

b Significant difference between the halters types (F = 15.2, $p \leq 0.05$)

c Significant difference between the halters types (F = 16.2, $p \leq 0.05$)

One-way ANOVA revealed that significant difference exists in AUI among OS for both NTFPs. The understanding level of asparagus collectors was higher than that of lichen collectors and it was also higher among NOS than OS. In the case of asparagus, the understanding level of OS was lower than NOS in all aspects except the technical one. Possible explanations for this difference include that most of the NOS are from Manohari VDC, which is located closer to the market centre, highway and Manohari Area Forest Office and they are also generally better educated than OS. A higher Understanding Index in the technical aspects (phenology and distribution of species) of the OS may be due to their long experience and extensive coverage of the forest to search for abundantly stocked areas. More importantly, most of the OS are from the *Praja* cast, and are renowned as 'forest dwellers' (*Bankaria* in Nepali language), with some still living within the forest. Because their livelihood has always mostly depended on forests, particularly NTFPs, they have an extensive knowledge of NTFPs. For example, one of the *Praja* said that the flowering and fruiting time of asparagus found on southern slopes of the *Siwalic* belt (a hill found in collection site) was earlier than the northern aspect. Although he did not know the scientific reason (probably greater sunlight exposure), he was correct. NOS typically only go to the marginal areas of the forest, and have little knowledge of the technical aspects.

In the case of lichen, the Understanding Index of the OS was less than that of NOS in all aspects and the difference is statistically significant (Table 3). This is because most of the NOS are from Daman which is located near the Palung Area Forest Office and market centre. They are also more highly educated than NOS, all of whom were from the relatively remote village of Gogane. A comparison of the Understanding Index of lichen and asparagus collectors reveals two interesting findings. First, the understanding levels of asparagus collectors in all aspects are higher than that of lichen collectors. Second, unlike in asparagus, the understanding levels of NOS lichen collectors of technical aspects are higher than that of OS lichen collectors. This could be explained by two factors. First, just three years ago, the current OS lichen collectors were NOS and because of scarcity of lichen they have changed their collection behaviour. This is the why lichen OS have greater technical capacities than asparagus OS. Second, lichen is complex in terms of its structure and physiology (a dual organism, with a permanent association of a mycobiont and a phycobiont). Therefore, those who have a theoretical background of lichen through formal education and training would have a greater technical knowledge than others.

CONCLUSIONS AND POLICY IMPLICATIONS

Low per capita income, small land area and low literacy rate are specific attributes of the NTFP collectors. The large share of NTFPs in their total income (45%) reveals that NTFPs play an important role in sustaining and improving their livelihood. In some cases, even though the NTFP resources are becoming depleted and the collectors have negative contribution margins, they are not leaving the business. Instead, they are changing their collection behaviour from non-overnight-stayer to overnight-stayer to increase their profitability. Therefore, without analyzing and acting to improve the socioeconomic conditions of collectors, sustainable management of NTFPs is likely to be difficult. One solution could be to secure an equitable share of the resource rent. The NTFPs markets are monopsonistic (few buyers), and unauthorised cooperatives of traders and wholesalers together with the close relations of wholesalers, authorities and Indian traders have increased their market power. The lack of understanding of the regulatory, marketing and technical aspects and the lack of a cooperative marketing group are clear disadvantages for collectors. As a result, the Makawanpur wholesalers and the Indian traders and wholesalers are able to secure more than 56% of the total resource rent. Collectors are solely dependent on a limited number of NTFPs for their livelihood, whereas Nepalese wholesalers and Indian traders and wholesalers deal in a large number of NTFPs. Clearly, inequity is evident in NTFP sharing.

If the collectors could sell NTFPs directly to Makawanpur wholesalers, instead of to agents and village traders, their contribution margin would be increased by about 13%. This could be achieved by forming local cooperative marketing groups of collectors and giving them collection permits, instead of issuing the permits to village traders and wholesalers. Helping these groups with credit, training and market information could be instrumental in teaching them to deal directly with wholesalers, with increased bargaining power and risk-bearing capacity. Priority should also be given to strengthening their institution by linking them with other cooperative groups including the Federation of Community Forestry User Groups. In

addition, exploiting overseas markets could break the monopoly of Indian traders. This could create an environment conducive to the entry of new buyers in the NTFPs business, creating more competitive markets on the demand side, and ultimately helping collectors to achieve increased contribution margins.

The lack of banking and cold storage facilities, multiple checkpoints and informal taxes are major problems for the operation of a supply chain that maximises value. Increase in such transaction costs have penetrated to the collectors, increasing the burdens and reducing their share of benefits. If these problems are resolved, traders would be prepared to pay more to the collectors. From the overall analysis, it is apparent that with any problem that affects the marketing chain, the ultimate losers are the collectors. Other tiers of the supply chain are only marginally affected. Of more than 465 species of lichen found in Nepal, only two species are being traded. If commercial uses could be found for other species, there could be greater diversification of NTFP businesses. This would to some extent improve the economic conditions of collectors and also the sustainability of harvesting the lichen species currently being collected. Therefore, finding diverse uses and users of lichen warrants special priority in Nepal.

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