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Non-Timber Forest Products and their Role in the Livelihoods of People of Nepal: A Critical Review

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Abstract

Nepal is a rich source of Non-Timber Forest Products (NTFPs) in terms of production and trading practices. The altitudinal and climatic variations in various pockets of Nepal have contributed to their diversity. This article attempts to outline the current status of NTFPs and its importance in the Nepalese economy. NTFPs provide rural people with food, medicine, construction materials, and income. About 80% of the rural population depend on the NTFPs for their livelihood and Nepal. NTFPs have commercial, socioeconomic and environmental values in rural communities. More than 700 species of plants are recognized as producing NTFPs and about 150 species of these are commonly used in international trade. The management of NTFPs has been receiving increasing attention from donors, development agencies and user groups who are involved in different aspects of NTFP promotion. Sustainable exploitation, commercialization of NTFPs are important for sociodevelopment, economic poverty reduction, livelihood enhancement of rural people in Nepal.

Keywords

NTFPs, Livelihood, Medicinal and aromatic plants, Revenue, Nepal

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Introduction

Non-timber forest products (NTFPs) are the products that are derived from forests other than timber (Ahenkan and Boon, 2011). NTFPs have recently been considered an important forest product, but for rural communities. These products have always been an important life support system (Chandrashekharan, 1998; Giri, Bhattacharya and Santra, 2001). NTFPs have importantly been cited as a significant forest product. Angelsen *et al.* (2014) and Shackleton and Pullanikkatil (2018) showed that NTFPs have been widely known to lead to the wellbeing of several rural and urban households and communities worldwide in different forms. Cocks and Wiersum (2003), Cocksedge (2006) and Endamana *et al.* (2016) reported that NTFPs are critical to the functioning, security, and reduction of subsistence, particularly for people residing in forest areas. For diverse ethnic groups all over the world, they have important cultural values and significance. NTFP revenue shares are ranging from just few percent to over 50% in and between regions and communities (Vedeld *et al.*, 2007; Angelsen *et al.*, 2014).

The geography and climatic conditions of Nepal are diverse, resulting in rich biodiversity. There are 11,971 flora recorded in Nepal, accounting for 3.2% of the total flora of the world (GoN, 2014). Plant species have various medicinal values. Nepal is rich in NTFPs species. In Nepal 700 plant species are medicinal, 440 are wild foods, 30 are spices, and other 71 are fibers yielding (Subedi *et al.*, 2014). Nepal has many bio-resources and is well-known for its remarkable group forestry strategies to forest management (Paudel, 2014; Paudel, 2015); its potential to contribute to the country's economic growth is still insufficient. The commercial, socioeconomic and environmental values of NTFPs are in existence. In Nepal, the NTFP sector is stagnating behind and contributes substantially to the national and local economies. Banjade (2012) reported that the forestry sector in Nepal was not exploiting its maximum potential. The NTFPs culture and development system is the core initiative for the Nepal Planning Commission (2015 to 2017). Comparably, the Forest Sector Policy (2015) demonstrates the contribution of NTFP manufacturing to rural livelihood and directs more to research and study. About 80% of the developing country's population relies on NTFPs in terms of basic health, nutritional requirements, and the generation of income (FAO, 1995).

NTFPs play an essential role in foreign exchange earnings, which is especially crucial for most developed countries, such as Nepal. The NTFPs for revenue generation were the primary priority of MPFS (Master Plan for Forestry Sector) (1988). In addition, NTFPs make a substantial contribution to poor people's health care by their medicinal and food values. The annual harvest and trading of NTFPs in Nepal in the Indian and overseas markets (approximately 90% as its raw material) of roughly 10,000-15,000 tons of NTFP, made up by more than 100 species, is around US\$ 8.6 million, approximately six times the official value in timber exports to India (Edward, 1996). The NTFPs enterprises employ thousands of collectors, village investors in Nepal for at least a few seasons in the year, including hundreds of trades as well as locally utilized forest products of natural biological origins. The demand for NTFPs has grown in recent years. NTFPs provide nutrients, medicines, fodder, wood, thatch, and building equipment for rural households, including mulch and non-farm profits. The higher the demand of NTFPs, the greater the ability it is, and the greater the probability of overexploitation, as defined by Ros-Tonen (1999). The objective of this article is to document the status of NTFPs and their roles in livelihood improvement of the people in Nepal. Relevant literatures from 1992 to 2020 were collected from journal articles, books, reports, proceedings papers on current situation of Non-Timber Forest

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Products (NTFPs) and their roles in livelihood improvement and income generation. Different types of NTFPs and their export and exploitation situation were discussed in this review paper. Web pages were visited, and the relevant information was collected. Authors' experiences in NTFPs were also internalized in the paper. Finally, information collected from different sources were analyzed and presented.

Forest Products in Nepal

In the formal trade of NTFPs, the information provided by Kanel (2004) on Community forestry and DoF (2005, 2006 and 2007) was accumulated on the total royalties. The involvement of the forestry sector to the national GDP (Gross Domestic Products) often depends on structured trade, which excludes many facets of economic valuation for forestry-generated goods and services. In order to include a more accurate estimate of the contribution of the forestry sector to the GDP of Nepal, the Nepal Foresters Association carried out a survey to evaluate and suggest appraisal methods in Nepal. In Nepal, there are more than 700 plant species that have medicinal value, of which 238 are in active use and 150 are traded (Acharya, 2014). 30 species of which 12 are commercially cultivated and market-fostered (AEC/FNCCI, 2004; Shrestha and Das, 2008; Subedi, 2006; Luintel et al., 2004) have been prioritized by the Government of Nepal. A 1995 survey by manufacturers, merchants, and processors of NTFPs from the eastern frontier of Nepalguni to the midwestern town shows that a total of 100 businessmen managed over 42,000 metric tons, equal to US\$26 million, with more than 100 specific products of the NTFP (Subedi, 1997). Annual shipments to India are projected to be between 10,000 to 15,000 tons of plant components of more than hundreds of species or 90% of overall trading in NTFPs (Edwards, 1996). Devkota (2006), by analyzing the royalty contribution of various forest products during the fiscal year 2002-04, illustrates that the contribution of medicinal and aromatic plants was only 3.5%; that of the rest of the non-timber products such as sand and gravel was 16.5% and that of timber and fuelwood was over 80%. In Nepal, the growing middle class and lifestyle changes also impact the trade-in and prospects of NTFPs. With more and more emphasis on organic way of living and use of natural products in developed countries, NTFPs are likely to be demanded and diversified further in use and commerce (Subedi, 2006).

Categories of NTFPs

The NTFPs can be grouped into two categories: consumptive and non-consumptive. Consumptive NTFPs on one hand are utilized at the personal and household level and also serve as the products sold in the market; whereas non-consumptive NTFPs on the other hand are related to the indirect benefit of sound forest management and promoting ecotourism (Hammet, 2004).NTFPs include medicinal and aromatic plants (MAPs), bamboo and rattan, dyes, fibers, papers, wild foods, soap detergents, resin, and others. The categories of NTFPs based on purposes were given in Table 1 below.

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Table 1: Categories of non-timber forest products based on their uses in Nepal

			cts based on their uses in Nepal	
S. No.	Category	Terai and Siwaliks	Hills (1000 to 3000 m	Mountains (above
		(upto 1000 m height)	height)	3000 m height)
1.	Medicinal	Aank, Akashbeli,	Akarkaara, Akashbeli,	Attis, Bhutkesh,
	and	Amala, Ander, Asuro,	Chiraito, Chutro,	Bhuinchuk, Bish,
	aromatic	Bel, Barro, Batulo	Bajradanti, Banjira, Batulo	Bishma, Dhupi,
	plants	Pate, Bhringaraj,	Pate, Bhutkesh, Bojho,	Dhupjadi,
		Bojho, Chiuri, Curry	Budo Okhati, Dalechuk,	Jatamansi, Jhyau,
		Leaf, Dhaturo,	Devdar, Dhasingre,	Kakoli, Kutki,
		Dhayaro, Dronpuspi,	Dhatelo, Dhaturo, Dhayaro,	Laghupatra,
		Ghodtapre,	Dronpuspi, Eklebir,	Lauthsalla,
		Ghyukumari, Gujro,	Gamdol, Ghoda Marcha,	Maharangi,
		Harro, Indrajau,	Ghyu Kumara, Guchichyau,	Maikopila,
		Indreni, Kakdsinghi,	Hadchur, Indren, Jhyau,	Ninejadi, Nirmasi,
		Kantakari, Kauso, Khas	Jiwanti, Kurilo, Kaladana,	Padamchal,
		Has, Kurilo,	Lauthsalla, Malagiri,	Padam Puskar,
		Laghupatra, Museli,	Pakhanved, Pudna, Satuwa,	Panchaaule,
		Neem, Pipla,	Siltimur, Sugandhakokila,	Sarmaguru,
		Rajbriksha,	Sugandhawal, Thulo	Somlata, Sunpati,
		Sarpagandha, Simal,	Okhati, Timur, Titepati,	Talispatra,
		Sindhure, Tatelo,	Tulasi, Tunni	Yarsagumba
		Ttepati, Tulasi, Tunni		
2.	Fiber	Bhang, Babyo, Ketuki	Allo, Babiyo, Bhang	
3.	Paper		Lokta, Argeli, Furkepat	
4.	Dyes	Bot Dhayaro	Chutro, Jamanemanro,	Padamchal,
			Majitho, Okhar (husk),	Bhuinchuk
			Kafal, Dalechuk	
5.	Bamboos,	Bamboos, Bet	Nigalo	Nigalo
	Rattans,			
	Vines			
6.	Wild food	Bel, Bayar, Bhyakur,	Ainselu, Bhyakur, Gunyalo.	Banlasun, Jangali
	including	Chiuri, Curry Leaf,	Kafal, Katush, Jhuse Til,	Jira, Jimbu,
	spices,	Jamun, Kadam, Kurilo,	Koiralo, Kukurdaino, Lapsi,	Padamchal
	culinary	Sajyon, Siplikan,	Latte, Lude, Malo, Nigalo,	
		Tejpat	Niuro, Okhar, Siplikan,	
			Sisnu, Tarul, Tejpat, Unyu	
7.	Resins		Khoye Salla	
8.	Soaps/	Rittha, Sikakai	Sedum spp., Pangar	
	detergents			
9.	Others	Bhorla, Dar,	Bilaune, Kaulo, Amriso,	Bhojpatra
		Chhatiwan, Khayar,	Nagbeli, Rudraksha	
		Pawan, Sajiwan, Sal		
		Seed, Simal,		
		Rudraksha		
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(Source: Pyakurel and Baniya, 2011)

The categories of NTFPs based on altitudinal zones was given in Table 2. The NTFPs are found from tropical to temperature regions in Nepal. The species vary with altitudes of the region.

Table 2: Categories of NTFPs based on altitudinal zones in Nepal

Altitudinal zone	NTFP species
1. Tropical(upto1000m)	Kurilo, Tulsi, Khayer, Bel, Harro, Barro, Amala,
	Sikakai, Tendu, Sarpagandha, Neem, Haldu, Jackfruit,
	Babul, Amaltus
2. Sub-tropical (1000 to 2000 m)	Lokta, Argeli, Chiraito, Wintergreen, Timur, Pipla,
	Tejpat, Dalchini, Kurilo, Rudraksha, Ritha, Majitho,
	Gurjo, Pushpa, Bhyakur, Bajradanti, Sugandhwal,
	Sugadhkokila, Vasa
3. Himalayan and trans-Himalayan	
a. Temperate (2000 to 3000 m)	Atis, Chiraito, Sugandhwal, Nirmasi, Chutro, Tilpushpi
b. Sub-alpine (3000 to 4000 m)	Chiraito, Morels, Padamchal, Satuwa, Sunpati, Juniper,
	Lichens, Laghupatra, Lauthsalla, Panchaunle
c. Alpine (above4000 m)	Kutki, Jatamansi, Yarshagumba

(Source: Subedi, 2006)

Medicinal and Aromatic Plants (MAPs)

The use of (MAPs) medicinal and aromatic plants as supplementary food and ethnomedicine together with the potential cash income is an extremely important source of livelihoods and resilience for the poor rural people of Nepal. The NTFPs have a major potential in the MAPs subsector. This is because more than 75% of the people in Nepal use herbal drugs (Kalauni and Joshi, 2018). MAPs have expanded its contribution to the economy of Nepal, with elevated prices than forestry goods (Acharya et al., 2015; Kalauni and Joshi, 2018). MAP species is extracted unsustainably. However, a sustainable production, processing, marketing, and consumption system has good potential to provide jobs and income to thousands of Nepalese people (Ghimire and Awasthi, 2016; Kalauni and Joshi, 2018; Karki, 2017). Nepal is estimated to export around 33,000 mt of MAP products with an annual revenue amount of around 19-60 million US\$ (MoFSC, 2009). The export value increased from US\$ 27.49 million in 2005 to US\$ 60.09 million in 2014. Nepal on average exported 13,230 mt worth US\$ 39.34 million per year equivalent of MAP products during the last 10 years (Kalauni and Joshi, 2018) to more than 50 countries. Approximately 800 species of MAPs and non-timber forest products (NTFPs) are used for subsistence livelihoods and over 160 species for commercial trade (Karki, 2004a; Karki, 2004b; DoF, 2008; GoN, 2009). Over 90% of the NTFPs exports are dispatched to India in crude forms, providing lesser benefits to the local and national economy compared to its potential benefits if value-adding processing was done within the country (ANSAB and EWW, 2000). Nepal, however, lacks the technical, financial, and guaranteed market capabilities for processed NTFPs. For instance, the secondary source of income of rural people is NTFPs, non-timber forest products (NTFPs) form the secondary source of income in most parts of Nepal; it provides 35-50% total income of a household in Karnali zone (Parajuli, 2005; GIZ, 2011). It is estimated that the contribution of bamboo to total household income is 1-2% (Karki, 1995). The list of some medicinal plants found in Nepal is given in Table 3.

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Table 3: List of some medicinal plants found in Nepal

SN	Trade name	Botanical name	SN	Trade name	Botanical name
1	Amala	Phyllanthus emblica	26	Bhojpatra	Betula utilis
2	Bhorla Bokra	Bauhinia vahlii	27	Bhutkesh	Jurenia dolomiea
3	Kurilo	Asparagus racemosus	28	Dhupipat	Juniperus species
4	Barro	Terminalia belerica	29	Guchhi	Morchella conica
5	Bojho	Acorus calamus	30	Katush	Castanopsis species
6	Jiwanti	Ephemerantha macarei	31	Gheukumari	Aloe vera
7	Lokta	Daphne bholua	32	Kutki	Neopicrorhiza
					scrohpularoflora
8	Somlata	Ephedra gerardiana	33	Nirmansi	Delphinium
					denundatum
9	Sugandhwal	Valeriana wallichii	34	Setak chini	Moringa oleifera
10	Bajradanti	Potentilla fruticosa	35	Siltimur	Litsea cubeba
11	Kauloko bokra	Persea species	36	Thingresalla	Abies spetabilis
12	Pakhanbed	Bergenia ciliata	37	Aank bhuwa	Calotropis gigantea
13	Datiwan	Achyranthes bidentata	38	Yarsagumba	Cordyceps sinensis
14	Rittha	Sapindus mukorossi	39	Kachur	Curcuma aromatica
15	Tejpat	Cinnamomum tamala	40	Bhyakur	Dioscorea species
16	Timur	Zanthoxylum armatum	41	Bishjara	Aconitum species
17	Chatiwan	Alstonia scholaris	42	Chiraito	Swertia chirayita
18	Chyau	Mushroom	43	Jhyau	Lichen species
19	Kakarsingi	Pistachia chinensis	44	Dalchini	Cinnamomum tamala
20	Satuwa	Paris polyphylla	45	Daruhaldi	Mahonia nepalensis
21	Chutro	Berberia asiatica	46	Tite pati	Artemisia dubia
22	Neem	Azadirachta indica	47	Ghod tapre	Centella asiatica
23	Pani amala	Nephrolepsis cordifolia	48	Tulsi	Ocimum tenuiflorum
24	Sisno	Urtica parviflora	49	Laali	Rhododendron
				Gurans	arboreum
25	Bayer	Ziziphus mauritiana	50	Rudilo	Pogostemon
					benghalensis

(Source: Kunwar et al., 2006)

NTFPs in Livelihoods

Non-timber forest products (NTFPs) have become increasingly recognized to support resilience and livelihood enhancement of rural communities in Africa, Asia, and elsewhere in developed as well as developing countries (Campbell and Luckert, 2002; Mukul *et al.*, 2010; Kar and Jacobson, 2012; Cavendish, 2000). A livelihood is sustainable, resources, and activities necessary to provide the livelihood (DFID, 1999), both material and immaterial social activities and resources. Traditionally and fundamentally MAPs and NTFPs are correlated with rural peoples' livelihoods. NTFPs have the potential to play a vital role in reducing seasonal and long-term malnutrition and food insecurity. Local people have indigenous knowledge of the available forest resources used for their food security in combination with agricultural production. Local people sometimes use these sources for income generation, which provides an opportunity for alternative livelihood options as

well (IUCN, 2001). In Nepal's forest policies and cumulative development planning, NTFPs have been extremely important. Interim Programme (2007/08 to 2009/10), Policies and Services of the current administration, 2008-09 fiscal expenditure, Political Participation Manifestations, Donor Reports, The Poverty Reduction Strategy Paper (PRSP) including country strategy papers as well as the program materials from bilateral projects and INGOs, the documents of Community Forestry Users Groups (CFUGs) recently highlighted the importance of NTFPs for conservation. In recent decades, with growing concern about conservation, together with rural poverty and sustainable development, researchers, as well as conservation and development organizations, made efforts to bring NTFPs at the centre of discourse (Belcher, Perez and Achdiawan, 2005; Subedi, 2006). As a result, the governments of several developing countries, including Nepal, received pressure to formulate policies that promoted NTFPs.

NTFPs and Income Generation

In household economies of rural societies residing in or close the forest, NTFPs have three primary functions. Initially, NTFPs support the needs of households for their subsistence and consumption for energy, nutrition, medicine, and construction, etc. Second, in periods of recession (e.g. revenue losses from certain sources of production, for example, crop failure), they are seen as a defense net and thirdly, certain NTFPs have daily cash (Angelsen and Wunder, 2003; Cavendish, 2002). The importance of NTFPs (utilization and monetary value) may also be significantly greater than timber production, or land conversion to pastureland or farmland (Rogue, 1992). There is also growing evidence that local and wider-scale commercialization of NTFPs is increasing in many regions, providing cash income to numerous households (Welford and le Breton, 2008; Cunningham, 2011). Research by Olsen (1998) reported that, during the fiscal year 1993/94, 470,000 Nepalese households were actively involved to collect economically important NTFPs species. In terms of employment, ANSAB (Asia Network for Sustainable Agriculture and Bioresources) estimated that around 189,000 people work in the NTFPs sub-sector (MSFP, 2014). It is widely estimated that they draw between 15 and 50% of their household income from the sub-sector (APAARI/FAO, 2013; Edwards, 1996; MSFP, 2014). A proper investment environment can create employment opportunities for local people reducing the heavy flow of youth migration to cities and foreign countries for jobs. This will also reduce poverty by providing income raising opportunities locally (GIZ, 2015; IUFRO, 2012). The list of some NTFPs having potentiality for developing enterprise is given in Table 4.

Table 4: List of NTFPs having potential for enterprise development

S.N.	Local Name	Scientific Name
1	Jatamansi	Nardostachys grandiflora D.C.
2	Neem	Azadirachta indica A. Juss.
3	Rittha	Sapindus mukorossi Gaertn.
5	Guchichyau	Morchella conica
6	Timur	Zanthoxylum armatum D.C.
7	Dalchini	Cinnamomum tamala (BuchHam)
8	Bet	Calamus tenuis
9	Shikakai	Acacia concinna (Wild) D.C.

10	Satawari	Asparagus racemosus Wild.
_11	Sabai Grass	Eulaliopsis binata
12	Sal leaves	Shorea robusta
13	Sugandhawal	Valeriana jatamansi jones
14	Atis	Delphinium himalayai Munz.
15	Pipla	Piper longum Linn.
16	Kutki	Picrorhiza scrophulariflora Pennell
17	Chiraito	Swertia chiraita (Roxb. Ex Flem, Karst)
18	Amala	Phyllanthus emblica L.
19	Barro	Terminalia bellirica (Gaertn.) Roxb.
20	Harro	Terminalia chebula Retz.
21	Tendu	Diospyros tomentosa Roxb.

(Source: Jayaswal, 2020)

Export of NTFPs

In Nepal, there are several local companies based on NTFPs, particularly basket making from bamboo. Daphne bark to produce lokta paper and Girardinia diversifolia for the manufacturing of alloy paper are some classical examples. NTFPs also provide a limited range of raw materials for industry in Nepal. Of most significance is resin tapping from *Pinus roxburghii*; katha extraction, a dye from the heartwood of Acacia catechu, and paper from Sabai grass (Eulalopsis binata). In terms of the volume and value of trade in NTFP, the Government of Nepal records indicates the growing trend in formal export trade. The trade volume increased from 3,350 tons in 1990 to 13,000 metric tons (mt) in 2010 (NPC, 2011) and to more than 33,000 mt in 2012 (Karki, 2012; MoFSC, 2009). In 2010 the export earnings from the NTFPs were estimated at between US\$13 million and US\$ 26 million (GoN (2009), as stated by Karki (2012). The annual value expansion of the NTFP between 1995 and 2002 was approximated to be around 5.5% per year (Subedi, 2006). According to an assessment undertaken out by ANSAB (MSFP, 2015), Nepal's NTFP exports rose from 2.76 million US dollars in 1992 to 59 million US dollars in 2012. The analysis showed a rise of about 4% a year between 1992 and 2002 in the share of NTFPs in the overall export volume, which doubled (MSFP, 2014). The findings suggest the optimistic growth trend in Nepal's NTFP market, with annual rises in the amount of NTFP traders and industries every year (MSFP, 2014). This pattern also enhances NTFPs' burgeoning economic, social, and ecological significance (IUFRO, 2012).

In Baitadi, Bista and Webb (2006) documented an NTFP contribution of 11.7%. In Baitadi, Darchula, and Dadeldhura, Kunwar *et al.* (2013) approximated 20% sales revenue. Olsen and Larsen (2003) estimated 12% contribution of MAPs in higher elevations in Nepal. Jadibuti Association of Nepal (JABAN) issues the recommendation letter to District Forest Office, Banke (Nepalgunj) for MAPs export and they have recommended to export 4,596 tons of MAPs in FY 2014/15 (JABAN, 2015), demonstrating that Nepalgunj is still the most favored transit city in Nepal in terms of MAPs export to India. 14 out of 17 MAPs were exported to India and only three (*Ganoderma lucidum, Paris polyphylla* and *Dendrobium* sp.) were exported to China via Kathmandu. Among the NTFPs and medicinal and aromatic plants (MAPs), tejpat (*Cinnamom*

umtamala), timur (Xanthoxylum aramatum), rittha(Sapindus mukorossi), ginger, honey and large cardamom are extensively grown as agro-forestry crops in Nepal. Average annual export of large cardamom from Nepal is about 5959 mt (TEPC, 2015). Although large cardamom has been one of the largest exports agro-products from Nepal, it has been facing stagnant demand in the international market because of limited value addition due to lack of modern processing and storage facility (NTIS, 2016). An approximate 20,000 households are participating in production, processing and marketing of timur (Xanthoxylum aramatum) in Nepal. The value chain of timur is estimated to generate around US\$ 1 million revenue to the government. However, collection and processing practice is primitive and the process is hard drudgery to women, children, and poor people as they use their traditional knowledge and tools to gather and process Timur (Prakrit, 2007; Karki, 2004; MOA/SNV, 2011).

Dadeldhura district, located in Far-Western Nepal, is a center for the trade of medicinal and aromatic plants, including Ganoderma products. tejpat (Cinnamom umtamala), resin (Pinus roxburghii) and rittha (Sapindus mukorossi), and have been harvested from that area. Resin is processed from both national forests and community managed forests. In the five years (FY 2069/070 to FY 2073/074), resin extraction revenue is about NRs. 980,981 (GoN, 2018). Dadeldhura's Forest Division also allows Ganoderma to be gathered in national and community forests with NRs of 5/kg. The gathering of this specific species was ascertained by a local trader as observed. The local trader incorporates 5-7 people during the monsoon season to harvest the species from the high mountain areas. The local traders then buy from collectors at NRs. 1,000/kg. The central retailer is liable for manufacturing involving washing, drying sorting, and packaging. Then a local seller sells it for NRs 4,000/kg to the dealer in Kathmandu and then sells it in NRs 10,000/kg to Chinese traders. The local trader has been involved in the business for 5 years and has sold around 1.5 tons of species from the Dadeldhura district. Ganoderma lucidum (family Ganodermataceae), Polypore basidiomycetous fungi, has a long history of use for promoting health and longevity in China, Japan, and other Asian countries. In Dadeldhura district, it is collected by the local communities from the trunks of living or dead trees, mainly from oak forests.

Exact contribution of the NTFP sub-sector to Nepal's national economy is difficult to establish for different sources of data indicate different levels of contribution (MSFP, 2014; FNCCI-AEC/NEHHPA, 2012). This is mainly because available data and information are not consistent and refer to a wide range of wild extracted, domesticated, cultivated, and processed goods or products. But it can be safely argued that NTFP sub-sector is a major source of rural employment and income for Nepalese farmers and a major source of revenue for the national and local economies (MSFP, 2014; Karki, 2012; Karki, 2015).

Exploitation of NTFPs

NTFPs are cultivated because of their medical values from ancient times. Early harvest and over-collection are the cause of the deterioration of NTFP species. People who are pressured by food shortages must earn money by collecting NTFPs. There is also competition among the primary collectors to collect more NTFPs. In addition, local traders sometimes encourage primary collectors to collect more NTFPs, especially for the most sought-after species on the market. NTFP species are often overexploited because of their higher market values (Edward, 1994; Karki, 1996; Sharma, 1996). The causes of degradation can be associated with an unclear definition of property rights, lack of knowledge on conservation, and increasing market demand (Subedi and Bhattarai, 1998).

There is a need to reinstitute local institutions for the sustainable collection of economically valuable NTFPs species.

Conclusions

Nepal is rich in NTFPs, which plays an important role in increasing rural income. NTFP enterprises are a potential way to contribute to poverty alleviation. The promotion and domestication of NTFPs, proper policy frameworks for harvesting, and better processing techniques are critical to ensuring food security, poverty reduction, and livelihood improvement. There is a need to make concerted efforts in releasing barriers of marketing and trade in NTFPs, and supporting and facilitating individuals and communities to harness benefits from NTFPs. Formulation of the site-specific and species-specific plans for the conservation, management, and utilization of the NTFP resources is necessary. Local communities should be empowered for growing and marketing of NTFPs.

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