

Status, Prospects and Challenges for Non-Timber Forest Products Conservation in Nepal: A Critical Review

Pramod Ghimire^{*1}, Nabaraj Pudasaini², Uchita Lamichhane³

¹Agriculture and Forestry University, Faculty of Forestry, Hetauda, Nepal. Email: pghimire@afu.edu.np

²Ministry of Industry, Tourism, Forest and Environment, Bagmati Province, Nepal. Email: nabusaini@gmail.com

³Agriculture and Forestry University, Faculty of Forestry, Hetauda, Nepal. Email: uniqueuchita123@gmail.com

**Corresponding author / ORCID: 0000-0002-2925-8844*

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Abstract

Non-timber forest products (NTFPs) consist of goods of biological origin other than wood, derived from forests, other wooded land and trees outside forests. The importance of NTFPs for sustaining rural livelihoods, fostering rural poverty alleviation, enhancing biodiversity conservation, and facilitating rural economic growth is well known in Nepal. In spite of these facts, NTFPs have not received the sustained and systematic support. With the gradual rise in population, unsustainable harvesting and depletion of resources, sustainable management of NTFPs has become a challenge. Similarly, the increasing global demand of NTFPs leads to over-exploitation of these resources that further leads to dwindling and adversely affecting the biodiversity. In this context, this paper intends to explore and analyze the conservation status, prospects and challenges for efficient and sustainable management of NTFPs in the context of Nepal.

Keywords

NTFPs; Livelihood; Sustainable management; Conservation; Nepal



Introduction

Nepal is well known for its rich biological and cultural diversities. Variability in physiographic and climatic condition has enriched the country with a high diversity of flora, fauna, ecosystems and cultural heritage. Overall, Nepal occupies about 0.1% of the global land mass in which floral diversity harbours 3.2% of the global diversity (MoFSC, 2014). The country is ranked on 25th position of global biodiversity richness and 11th among Asian countries (MoFE, 2018b). The country boasts over 11,971 flora species out of which 284 flowering plants are endemic to Nepal (MoFSC, 2014). Based on various publications related to flora of Nepal, about 5,833 species of flowering plants have been recorded by Koba *et al.* (1994), 6,500 by DoF (2004), 6,973 by MoFSC (2014), and, recently, Rajbhandari *et al.* (2017) have reported 5,309 species under 1,515 genera and 193 families. In total 7,000 species of vascular plants are found in Nepal and more than 2,000 species are regarded as producing the NTFPs, among which 1,624 species are estimated to have medicinal uses (MoFSC, 2012).

Non-timber forest products (NTFPs) are also known as minor forest products (MFPs) and non-wood forest products (NWFPs). There is no uniformity in the use of the term. FAO (1999) has defined NTFPs as all goods of biological origin as well as services derived from forests, other wooded land and trees outside forests, and excluded woods in all its form. There are many other terms that have been used for these products, such as alternative, special, and secondary – all of which emphasize that the product is subsidiary objective of forest management. It means, their production is secondary in importance and excludes woods in all its forms (Wong, 2002). In Nepal, the NTFPs are also termed as *Jaributi* (herbs) and include all biological materials and different services rendered by forest land; for example, medicinal materials, fibers, dyes, gums, fatty oils, wild edible products (vegetables, fruits, spices and condiments), agricultural implements, thatching grasses, rattan, resins, pesticides, animal bedding, veterinary medicines, green manure, ornamental plants, cosmetics, ceremonial products, tannins, charcoal, honey, food, etc., and wildlife products (e.g., bones for ritual and decoration) are grouped as NTFPs (GoN/MOFSC, 1993).

NTFPs are important component of the Nepalese economy. They are associated with socio-economic and cultural life of forest-dependent communities inhabiting in a wide range of ecological and geo-climatic conditions throughout the country (Rijal *et al.*, 2019; Rai *et al.*, 2019). Globally, a large proportion of rural populations depend on NTFPs for livelihoods, such as for food, nutrition, medicines, fodder, fibres, and other useful materials (Shrestha *et al.*, 2020; Talukdar *et al.*, 2021). In the mountains of Nepal, 10-100% of households are involved in the collection of medicinal plants and other NTFPs; and in certain rural areas, this contributes up to 50% of the family income (Olsen and Larsen, 2003; Rijal *et al.*, 2019; Rai *et al.*, 2019; Shrestha *et al.*, 2020). In the past, NTFPs had been considered secondary in importance against the timber and were confined to local economies, as very little knowledge existed about them. In recent years, NTFPs have attracted considerable global interest. This is due to the increasing recognition of the fact that NTFPs can fulfill community needs for improving rural livelihoods, contribute to household food security and nutrition, help generate additional employment and income, offer opportunity for NTFP-based enterprises contributing to foreign exchange, and support biodiversity and other conservation objectives (Pandey *et al.*, 2016; Rai *et al.*, 2019). In the past few 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 *et al.*, 2005; Subedi, 2003; Banjade and Paudel, 2008). As a result, the governments of several developing countries, including Nepal, received pressure to formulate plans and policies that promoted NTFPs. Following the changing global focus, forest policies in Nepal for the last three decades have also highlighted NTFPs through various policy documents, public meetings, party manifestos and other documents. This paper aims to analyze the conservation status, prospects and challenges of NTFPs for the efficient and sustainable use in Nepalese context.

This study is based on an extensive review of government policy documents, available published and grey materials. Google Scholar and ResearchGate were the primary databases used for acquiring the literature

with keyword ‘Prospects and Challenges of Non-timber forest products conservation in Nepal’. A total of 51 results from 1976 to 2019 were obtained. Finally, the literatures collected were systematically reviewed for logical discussion and conclusion.

Current Status of NTFPs in Nepal

Small, but the diverse, geography and climate of Nepal have shaped it into a unique land of NTFPs along with other natural resources. According to an estimate, over 2,000 species of plants are considered to be potentially useful, including food, nutrition and medicinal plants (MoFSC, 2012). The most known and important Nepalese NTFP-producing species, with their local names in parentheses, are *Picrorhiza kurroa* (Kutki), *Dactylorhiza hatagirea* (Panch Aule), *Nardostachys grandiflora* (Jatamasi), *Ophiocordyceps sinensis* (Yarsagumba), *Rheum australi* (Padmachal), *Morchella conica* (Guchhi Chyau), *Swertia chirayita* (Chiraito), *Rauvolfia serpentina* (Sarpagandha), *Rubia manjith* (Majitho), *Asparagus racemosus* (Kurilo), etc. The majority of NTFPs fall into two contrasting groups: high value NTFPs from high altitudes (i.e., above 2,000 m) and low value NTFPs from lower altitudes (i.e., below 2,000 m) (Amatya *et al.*, 2016). For example, whole plants of Yarsagumba, roots of Kutki, and rhizomes of Panchaule fall under the high value groups of NTFPs, whereas the root of Kurilo, fruits of Ritha, bark and leaves of Tejpat, and bark, fruits and seeds of Timur fall under the low value NTFPs. In terms of distribution pattern of NTFPs, Nepal's tropical region (below 1,000 m) holds 49% of them, subtropical region (1,000-2,000 m) 54%, temperate region (2,000-3,000 m) 36%, sub-alpine region (3,000-4,000 m) 18%, and alpine region (above 4,000 m) holds 7% (Malla and Shakya, 1995). The high mountains are highly admired for high value but low volume of NTFPs, hence, fetching higher prices.

Ministry of Forest and Environment, Government of Nepal has given its priority on NTFPs development, and that is why Government of Nepal has introduced NTFPs development programme in all 75 districts of Nepal. Similarly, Government of Nepal (GoN) has categorized 237 NTFPs in 8 groups for royalty determination under the Schedule-3 of the Forest Regulation 1995 (Table 1).

Table 1: NTFPs categories according to their uses

S.N.	Categories of NTFPs	Species Number	Percentage (%)
1.	Root and buds species	48	20.3
2.	Bark species	25	10.5
3.	Leaves and stem species	30	12.7
4.	Flower and fur species	16	6.7
5.	Fruits and seeds species	65	27.4
6.	Entire plant species	21	8.9
7.	Gum, and resin species	8	3.4
8.	Others	24	10.1
	Total	237	100

Source: MoFSC, 2012

The GoN has also imposed restrictions on the export of 12 NTFPs species under section 77 of the Forest Act 2019 (Table 2). Other international conservation agencies, like IUCN, CITES, have also listed such plant species in their Red Data Book¹. The IUCN has listed total 9 groups of species in four different categories (MoFSC, 2014), while the CITES has listed a number of species existing in Nepal under various CITES appendices; viz. a total of 417 species (2 species in Appendix I; 411 species in Appendix II; and 4 species in Appendix III) (MoFE, 2018a).

¹ <https://www.iucnredlist.org/>

Table 2: NTFPs species protected in Nepal

S.N.	Scientific Name	Common Name	Local Name	IUCN Red List Status	CITES Appendix Status
A. Species banned for collection, use, sale, distribution, transportation and export					
1	<i>Dactylorhiza hatagirea</i>	Salep	Pachaule		II
2	<i>Juglans regia</i>	Walnut	Okhar		
3	<i>Picrorhiza kurroa</i>	Picrorhiza	Kutki	VU	II
B. Species banned ² for export outside the country without processing					
1	<i>Nardostachys grandiflora</i>	Spikenard	Jatamansi	VU	II
2	<i>Rauvolfia serpentina</i>	Serpentine	Sarpagandha	ED	II
3	<i>Cinnamomum glaucescens</i>	Nepali Sassafras	Sujandhakokila		
4	<i>Valeriana jatamansii</i>	Indian Valerian	Sugandhawal		
5	<i>Parmelia</i> spp.	Lichen	Jhyau		
6	<i>Abies spectabilis</i>	Himalayan Fir	Talis Patra		
7	<i>Taxus wallichiana</i>	Himalayan Yew	Lauth Salla		II
8	<i>Ophiocordyceps sinensis</i>	Chinese caterpillar fungus	Yarsagumba		
9	Rock Exudate	Shilajit	Shilajit		

Source: DoF, 2018

Similarly, the government has taken some initiation on conservation of NTFPs by prioritizing 30 major species for economic development of the country (Table 3) and 12 species have been selected for research and agrotechnology purpose (DoPR, 2009).

Table 3: NTFPs prioritized for economic development of Nepal

S.N.	Nepali Name	Scientific Name	Distribution (m)	Used Part	Major Use
1	Atis	<i>Aconitum heterophyllum</i>	2,400-4,100	Root, tuber	Medicine
2	Bisha	<i>Aconitum spicatum</i>	3,300-4,300	Root, flower, leaf	Medicine
3	Bojo	<i>Acorus calamus</i>	200-2,300	Root	Medicine, aromatic oil
4	Kurilo	<i>Asparagus racemosus</i>	150-2,100	Root, rhizome	Medicine, food
5	Neem	<i>Azadirachta indica</i>	100-900	Entire plant	Medicine
6	Paskhanbed	<i>Bergenia ciliate</i>	1,600-3,600	Root, rhizome	Medicine

² Species banned for export except for processed with permission of Department of Forest and Soil Conservation (On the recommendation of the Department of Plant Resource) or the Herbs Production and Processing Company Limited (except for their own production) and the pre-approval of the Department of Forest and Soil Conservation, the following 9 items can be processed in the country for export, otherwise banned.)

S.N.	Nepali Name	Scientific Name	Distribution (m)	Used Part	Major Use
7	Sugandhakokila	<i>Cinnamomum glaucescens</i>	2,000-2,500	Fruit	Medicine, aromatic oil
8	Tejpat	<i>Cinamomum tamala</i>	450-2,100	Bark, leaf	Medicine, spices
9	Yarsagumba	<i>Ophiocordyceps sinensis</i>	4,200-5,000	Whole plant	Medicine
10	Pachaule	<i>Dactylorhiza hatagirea</i>	2,800-4,000	Root, tuber	Medicine
11	Bhyakur	<i>Dioscorea deltoidea</i>	450-3,100	Root, fruit	Food
12	Dhasingre	<i>Gaultheria fragrantissima</i>	1,200-2,700	Leaf	Medicine, aromatic oil
13	Okhar	<i>Juglans regia</i>	1,200-3,000	Fruit, bark	Medicine, food, dye
14	Guchhi Chyau	<i>Morchella conica</i>	2,000-3,500	Whole plant	Food
15	Jatamansi	<i>Nardostachys grandiflora</i>	3,600-5,000	Root, rhizome	Medicine, aromatic oil
16	Kutki	<i>Picrorhiza kurroa</i>	3,600-4,800	Root, rhizome	Medicine
17	Jhyau	<i>Lichens</i>		Whole plant	Medicine, food
18	Amala	<i>Phyllanthus emblica</i>	150-1,400	Fruit	Medicine, food
19	Pipla	<i>Piper longum</i>	200-800	Leaf, stem	Medicine, spices
20	Laghu patra	<i>Podophyllum hexandrum</i>	2,400-4,500	Root	Medicine
21	Sarpagandha	<i>Rauvolfia serpentina</i>	100-1,200	Root	Medicine
22	Padmachal	<i>Rheum austral</i>	3,000-4,200	Root, stem	Medicine, food
23	Majitho	<i>Rubia manjith</i>	1,200-2,100	Root, stem	Medicine, dye
24	Rithaa	<i>Sapindus mukorosi</i>	1,000-1,400	Fruit, bark, seed	Medicine, detergent
25	Chiraeto	<i>Swertia chirayita</i>	1,500-3,000	Entire plant	Medicine
26	Jangali Sayapatri	<i>Tagetes minuta</i>	1,200-2,500	Entire plant	Medicine, aromatic oil
27	Lauth Salla	<i>Taxus wallichiana</i>	2,400-3,400	Leaf	Medicine
28	Gurjo	<i>Tinospora sinensis</i>	300-1,500	Climber	Medicine
29	Sugandhawal	<i>Valeriana jatamansii</i>	1,500-3,600	Root, rhizome	Medicine, aromatic oil
30	Timur	<i>Zanthoxylum Armatum</i>	1,100-2,500	Fruit	Medicine, spice

Source: DoPR, 2009; MoFSC, 2012

Forest Sector Policies in Promotion of NTFPs in Nepal

Several policy and legal provisions cover the NTFPs sector in Nepal. The most prominent of them are the National Forestry Plan 1976, the Master Plan for the Forestry Sector (MPFS) 1988, the Forest Act 1993, the Forest Regulation 1995, the Forest Act 2019, the Herbs and NTFPs Policy 2004, and international conventions such as the Convention on Biological Diversity (CBD) and Conventions on International Trade

of Endangered Species of Flora and Fauna (CITES). The major policies and legislations and their provisions related to NTFPs development and promotion in Nepal are highlighted below in the table 4.

Table 4: NTFPs related policies and their provisions in Nepal

Year	Legislation/Policy	Features
1976	National Forestry Plan ³	<ul style="list-style-type: none"> Shift of focus to hill forest, recognized need for improved management of NTFPs. Identification of need of appropriate management of NTFPs
1988	Master Plan for Forestry Sector ⁴	<ul style="list-style-type: none"> Heavy emphasized on community forestry. Local control, separate program on NTFPs with medicinal plants as a main component. Classified NTFPs in 7 major categories.
1992	Convention on Biological Diversity ⁵	<ul style="list-style-type: none"> Provides international policy framework for conservation and sustainable use of NTFPs, priority in equitable benefit sharing of benefits.
1993	Forest Act ⁶	<ul style="list-style-type: none"> Promotes community forestry but continue strict regulation of people's right to forest products. Imposed restrictions on the collection sale, distribution and export of endangered and valuable NTFPs species.
1995	Forest Regulation ⁷	<ul style="list-style-type: none"> Detailed description of the restrictive procedures required to utilize NTFPs and Medicinal and Aromatic Plants (MAPs).
2002	Nepal Biodiversity Strategy ⁸	<ul style="list-style-type: none"> Provides a systematic approaches and strategies for the promotion of NTFPs priority in equitable benefit sharing and sustainable harvest.
2004	Herbs and NTFPs Policy ⁹	<ul style="list-style-type: none"> Promoted conservation and sustainable management of NTFPs. Improvement of harvesting, processing and marketing of NTFPs. Local participation in NTFPs development, income and employment opportunities.
2012	NTFPs Inventory Guideline ¹⁰	<ul style="list-style-type: none"> Provides systematic approaches for inventory and assessment of NTFPs resources in the country.
2014	National Biodiversity and Action Plan ¹¹	<ul style="list-style-type: none"> Emphasizes a systematic approach and strategy for the conservation and promotion of NTFPs. Priority is given to people's participation, equitable benefit sharing and sustainable harvest.
2019a	National Forest Policy ¹²	<ul style="list-style-type: none"> Emphasizes on conservation, development, management and processing of NTFPs.
2019b	Forest Act ¹³	<ul style="list-style-type: none"> Promotes conservation, development and sustainable management of forest resource or biological diversity. Imposed restrictions on the collection sale, distribution and export of endangered and important NTFPs species.

³ <https://www.worldcat.org/title/nepals-national-forestry-plan-1976-2033/oclc/12952728>

⁴ <https://lib.icimod.org/record/3656/files/MpffsnSummaryoftheprogrammes63490685MIS.pdf>

⁵ <http://www.pngcepa.com/wp-content/uploads/2018/07/CBD-Convention.pdf>

⁶ <http://www.lawcommission.gov.np/en/wp-content/uploads/2018/10/forest-act-2049-1993.pdf>

⁷ http://www.forestation.org/app/webroot/js/tinyMCE/editor/plugins/filemanager/files/Forest_Regulation_1995%202_.pdf

⁸ https://www.mofe.gov.np/downloadfile/4_Biodiversity_Strategy_1526380257.pdf

⁹ https://www.mofe.gov.np/downloadfile/11_NTFPPolicy_1526466471.pdf

¹⁰ https://dofsc.gov.np/public/uploads/files/1593847620NTFP%20Guideline_Last%20Final_SGOP_Leaout_new.pdf

¹¹ <https://www.cbd.int/doc/world/np/np-nbsap-v2-en.pdf>

¹² https://www.mofe.gov.np/downloadfile/Ban%20Niti_1554873640.pdf

¹³ <http://www.lawcommission.gov.np/en/wp-content/uploads/2021/03/The-Forest-Act-2019-2076.pdf>

Prospects of NTFPs in Nepal

About 7,000 vascular plant species have been reported in the country so far, out of which more than 1,600 are identified having medicinal value, of which 238 are chemically tested and 160 species are in collection and trade (Subedi, 2003; GoN, 2004; MoFSC, 2012). The Government of Nepal has kept 30 species in priority list, from which 12 are for commercial cultivation and market promotion (Subedi, 2006; DoPR, 2009). It is well established that NTFPs fulfill multiple functions in supporting human well-being. NTFPs have been a welfare or livelihood commodity for long; these are traditional sources of food and nutrition, medicine, fodder, fuel, thatch and construction materials, mulch and non-farm income (Malhotra and Bhattacharya, 2010; Pandey *et al.*, 2011). About 80% of the households in rural hilly areas in the country are reported to be involved in commercial collection of NTFPs and MAPs in Nepal (NEHHPA, 2012; Rai *et al.*, 2019). The Department of Forest and Forest User Groups (FUGs) collect revenue of NPR 25 million per annum from the trading of NTFPs (MoFSC, 2012). NTFPs sub-sector in Nepal contributes about 5% to the National Gross Domestic Product (GDP), and about 15% GDP is contributed by the whole forestry sector (ANSAB, 1999; MoFSC, 2009). More than 160 types of NTFP species are harvested from the wild and traded in international market, mostly to India; 95% of the NTFPs are collected from the wild and 90% are exported to India in raw form (MoFSC, 2012).

The NTFPs create high economic value and large-scale employment. NTFPs have become the major source of livelihood for farmers in the mid-hills of Nepal and continue to be in future, as there is a lack of off-farm employment opportunities (Olsen and Larsen, 2003; NEHHPA, 2012). There is always a strong potential for community forests to serve as the basis for improving the quality of life and the status of livelihoods in rural Nepal while conserving forest resources, on the other hand (Thoms, 2008). In recent years, NTFPs have attracted considerable global interest due to the increasing recognition of the fact that they can provide important community needs for improved rural livelihood (FAO, 1999; World Bank, 2006). The importance of NTFPs for sustaining rural livelihoods, furthering rural poverty alleviation, biodiversity conservation, and facilitating rural economic growth is well known. Even with good evidence of the fact, NTFPs have not received the sustained and systematic support (Luintel *et al.*, 2004; Upriety *et al.*, 2016; Rai *et al.*, 2019). With the gradual increase in population and depletion of natural resource base, sustainable management of the NTFPs has become a challenge (Pandit, 2001; Upriety *et al.*, 2016). Similarly, the increasing global demand of NTFPs leads to over-exploitation of these resources, which further leads to dwindling the biodiversity and adversely affecting the ecology. Therefore, it is very essential to educate and capacitate forest managers and forest users about the importance of NTFPs in their livelihood for sustainability of the forest resource management.

Challenges of NTFPs in Nepal

Non-Timber Forest Products (NTFPs) in Nepal are being increasingly recognized for their role in rural livelihoods, biodiversity conservation and economic values. As such they are of interest to a wide disciplinary range of researchers and government agencies seeking to promote rural livelihoods, incomes, and ecologically sustainable practices (Shackleton *et al.*, 2018). The market of NTFPs is expanding, and this is an opportunity as well as a challenge for a more sustainable, efficient and equitable management of NTFP resources. Effective management through sustainable harvesting and market driven commercialization are two contrasting aspects that are bringing challenges in development of NTFPs sector. Inventory and research on NTFPs, identifying potential species having market value, conducting value chain analyses, promotion of capacity building and technology transfer and sustainable management of NTFPs need analysis of their use patterns by communities and trends at a regional scale (Subedi, 2003; Heinen and Shrestha-Acharya, 2011; Upriety *et al.*, 2016). Some of the major challenges for conservation and sustainable management of NTFP species in Nepal are discussed in the following sub-headings.

Inventory and research on NTFP species

In Nepal, need for inventory and research on NTFP species is a major issue. Various studies indicate that there is lack of inventory of NTFP resources in the country (Luintel *et al.*, 2004; Heinen and Shrestha-Acharya, 2011). Therefore, there is a ominous need for inventory of NTFPs in Nepal to find out what there is and in what quantity. What NTFP species are there, what are their ecological niche, what is their status, are they abundant or declining? Such aspects need to be assessed (Heinen and Shrestha-Acharya, 2011; Uprety *et al.*, 2016). At present, all these information are scattered and there is no linkage between them. For example, in mid-west and far west Nepal, it is said that there is a trade worth millions of dollars of Yarsagumba (*Ophiocordyceps sinensis*), a rare and protected plant species in Nepal colloquially known as caterpillar fungus used as aphrodisiac and tonic in Chinese medicine, but none knows the exact volume of the available plant material. Thus, identification and inventory of NTFP species are very important for sustainable management.

Production and harvesting management

Unsustainable harvesting of NTFP species is another issue in NTFPs sector in Nepal. The management options for increasing production while making it sustainable do not exist in practice in most of the areas. The current practice of NTFP utilization involves only harvesting that is convenient to the collectors. Often, collectors do not know which species are traded. There are instances of early harvest due to competition without leaving sufficient stock for regeneration of many NTFPs. Generally, the harvesting practices are unsustainable due to a lack of sensitivity and market information (Subedi, 2003; Heinen and Shrestha-Acharya, 2011). Therefore, there is a need to consider several possible options for production management depending upon the institutional arrangements, capacity enhancement, information transformation and commercial opportunities. The key for the sustainable management is the reconciliation of biological sustainability with commercial viability. There may be several possibilities to increase the NTFPs production in a sustainable way: improving production from the wild, through domestication and improving harvesting technologies, reducing post-harvest lost, and institutionalization of management system.

Value addition

Lack of proper value addition is another challenge for NTFPs management in Nepal. The value of Nepal's NTFPs is significant, but the potential of value adding opportunities is unrealized. There is not much processing and value addition being done to NTFPs that are collected and exported to India mostly in raw form. The collected or produced NTFPs from wild or cultivated land can be sold in different forms i.e., crude raw materials, improved raw materials or processed raw materials through different marketing channels. The improved and processed raw materials generally yield higher price than crude raw material. Value addition to the raw material can not only increase employment but also can contribute to the economic development of a region or nation. Unfortunately, value addition or processing of NTFPs in Nepal has exploited and deprived the local producer or collectors due to the lack of coordination between collectors and local traders (Subedi, 2003; Heinen and Shrestha-Acharya, 2011; Chakravarty *et al.*, 2015). A lack of market and marketing infrastructure, and limited access to availability of information and technology for product development and processing are hindering the value addition process. Resource based enterprise development has not been initiated in the country. Thus, there is a need for increasing the efficiency in each stage of the value chain of NTFP products. NTFPs can be processed, or value added into consumer-oriented products. Processing or value addition of NTFPs should now be promoted as an approach to local development, particularly in NTFPs rich country like Nepal. Improvement to raw materials and the processing are two major examples of value addition that can be done by local communities.

Domestication

Studies show that NTFPs can be domesticated, like other agricultural crops (Leakey and Newton, 1994; Bista and Webb, 2006; Pandit, 2008). In Nepal, NTFP producing species are almost non-domesticated. Unfortunately, many of the most often used annual and perennial NTFPs remain neglected for domestication till date. Though DoPR (2009) under the Ministry of Forest and Environment (MoFE) has prioritized 12 NTFPs for research and cultivation, domestication of NTFPs is still in slow pace and not extensive. The people are generally not very much willing to cultivate NTFPs on the cultivated land. No research has been done so far why people are unwilling to domesticate, as NTFPs have high potential in fulfilling the household needs. In Nepal, some efforts have been made by individuals and groups to domesticate some exotic as well as indigenous NTFP species. But there are several stages of scientific procedures, which need to be addressed during the domestication process, such as characterization, germplasm exploration, vegetative propagation, genetic selection, and incorporation into a sustainable land-use system (Leakey and Newton, 1994; Subedi, 2003; MoFSC, 2012). The domestication of promising, under-exploited species in private farmland, community managed forest land and leasehold forest land can contribute a lot to this sector. Agroforestry practice can also offer a flexible land use system by which NTFPs can be domesticated gradually in a way that is adapted to local conditions and practices.

Marketing and trade

Another equally important challenge associated with promotion of NTFPs in Nepal is the lack of market and marketing information. The insecure and seasonal fluctuation in market price of the products, and the difficulties in processing, were the biggest issues in NTFPs sector. The main difficulties are getting reliable information, processing technologies and access to market. Community forestry, small holders, family farmers, and producers need to be able to meet the standards of quality and sustainability as important purchasing criteria (ASEAN, 2020). A study shows that trade in NTFPs is not transparent, and traders have greater influence over the pricing mechanism (traders-oriented price). Despite the materials are of good quality, harvesters do not have much stake in pricing due to the non-transparent nature of NTFP trade. Traders do not want to share real prices and mostly work in isolation. There is a huge gap between road head traders and harvesters, and harvesters get very little of the profit (Subedi, 2003; Heinen and Shrestha-Acharya, 2011; Uprety *et al.*, 2016). In Nepal, NTFPs are sold in local, urban, national, regional and international markets. There seems market for NTFPs, but existence of market does not assure the access to the market, which is quite often very difficult to get for NTFPs. Majority of high-value NTFPs are located in very remote area, the processing and marketing costs are generally high. The NTFPs produced in remote areas are sold through a long marketing channel which is inefficient and costly from the perspective of the collectors. Moreover, the current trade chain is not providing the fair share of profits to the harvesters or collectors. The support services available for processing and marketing of NTFPs are not adequate for small fair-trade businesses. In some cases, these are favourable for illegal transactions. The additional challenges faced in marketing of NTFPs are the lack of marketing infrastructure, imperfect wholesale market for NTFPs (created by limited number of wholesalers, controlled by government and the major buyers), limited access to availability of information and technology for product development, difficulties in matching market requirements by suppliers due to several uncertainties such as reduction fluctuation, decreased collection, inconsistent quality of products coming from many sources, and guaranty of collection permits. So, there is a serious need to explore and address the existing markets and marketing systems of NTFPs. Improvement in communication about markets, prices and other concerns to collectors and traders can improve the market strategy for NTFPs promotion in Nepal.

Certification

Forest certification (FC) is a concept accepted worldwide, and that advocates the reflectance of sustainable forest management (SFM) and gives assurance to forest product users (FAO, 2000). Forest certification is intended to improve forest management via market-based incentives, and it is based on the assessment of

the social, economic and environmental aspects of forest management as per the predetermined set of standards (FAO, 2000; FSC, 2015). Certification of forests is a newly introduced concept in Nepal and has formally been introduced by the Private Public Alliance (PPA) as a tool to promote sustainable forest management (SFM) and responsible business practices focusing on NTFPs (Kandel, 2007). Aiming the NTFPs, 14,086 hectares community-managed forests were certified in Bajhang and Dolakha districts under Forest Stewardship Council (FSC) certification scheme between 2004 and 2005 (FSC, 2015; Kandel, 2007). Nepal Foresters Association (NFA) and Asia Network for Sustainable Bioresources (ANSAB), supported and funded by United States Agency for International Development (USAID), are major organizations involved in initiating and promoting forest certification schemes in Nepal. Currently, the area has been expanded to more than 80 community forest user groups (CFUGs) having their 17,146 hectares forests are certified incorporating payment for ecosystem services. It is meant to ensure that 24 NTFPs including herbal products, essential oils are sustainably harvested from sustainably managed forest (Acharya and Karki, 2015; Subedi *et al.*, 2015).

However, certification of forest products (especially NTFPs) requires a base of knowledge regarding the ecology, socioeconomics and legal aspects of non-timber forest products, much of which is undocumented and unknown. A common challenge in NTFPs certification is the difficulty of marrying a system driven by international scientific norms with local community practices and cultures. Chain of custody (CoC)¹⁴ certification has not been performed yet to export the NTFPs from certified forests of Nepal. On the one hand, the barriers to achieving certification for products from forests controlled by CFUGs are high, whereas the economic return remains largely unrealized in the absence of market where sustainably produced forest products are valued (Ebrahim *et al.*, 2014). Some specific factors that are hindering the certification of forest products in Nepal are:

- Inaccessibility of certification to small scale producers
- Problems in meeting quality standards developed for industrial scale forestry
- Complex chain of custody
- Lack of capacity to achieve the technical conditions necessary for certification
- Lack of market demand for NTFP products certified as environmentally friendly, or as originated from 'well managed' areas
- Lack of ecological information to be able to prove the sustainability of any given harvesting operation.

Hence, there is a need to explore and address the existing certification issues. Promoting culturally appropriate education, capacity building and training, identifying synergies between forest and fair-trade certification, and leveraging the local and regional market could scale up the forest certification programme in Nepal.

Policy perspectives

More than 1 billion people globally use or trade non-timber forest products with the majority of NTFP use and trade occurring at local and regional scales, generally invisible to researchers and policy makers (Shanley *et al.*, 2016). Among the developing countries, Nepal has been progressive in conservation and management of NTFPs for nearly four decades. The country formulated comprehensive legislation for the protection and management of natural resources (including NTFPs) and has amended conservation legislation many times to include more participatory approaches that have had many measured successes (Heinen and Shrestha-Acharya, 2011; Uprety *et al.*, 2016). The most prominent of them are Master Plan for the Forestry Sector (MPFS) 1988, Convention on Biological Diversity (CBD) 1992, the Forest Act 1993, the Forest Rules 1995, the Herbs and NTFP Development Policy 2004, the Forest Act 2019, etc. The MPFS

¹⁴ Chain of custody certification is a mechanism, which verifies that certified material is identified or kept separate from non-certified material.

1988, which is the first comprehensive policy statement in Nepal's forestry sector, recognizes the participatory approach to forestry, but fails to appreciate the scope of the NTFPs as an important area of intervention from conservation as well as economic viewpoints. When evaluated in terms of the impact of the forest legislation on NTFPs conservation and management, the national policy objectives do not seem to be properly translated into regulations. The regulations pertaining to NTFPs are still based on restrictive policy (Ojha, 2000; Shrestha-Acharya and Heinen, 2006; Heinen and Shrestha-Acharya, 2011). Some of the major policy issues related to NTFPs that need to be addressed in the future are:

- Contradictions between the Forest Act and the Local Governance Act regarding control over NTFPs use and management;
- Ad-hoc royalty rates for NTFPs and absence of well-developed system of determining royalty;
- Ban or restriction on collection and trade of commercially valuable NTFPs that can be harvested on a non-destructive basis;
- Lengthy and costly export formalities for NTFPs trade; and
- Inappropriate control and absence of enabling environment for conservation and trade of NTFPs.

The above-listed issues suggest that the government's efforts have focused on controlling the extraction, use and trade of NTFPs, while the resourceful traders are drawing profits often exploiting the local producers or collectors in the value chain, irrespective of regulatory control (Ojha, 2000; Shrestha-Acharya and Heinen, 2006). Nepal has a separate policy for NTFPs, but there are no implementation plans or regulations formulated in accordance with the policy. However, the recent Nepal National Biodiversity Strategy and Action Plan 2014 and the Forest Policy 2019 have emphasized sustainable use and management of NTFPs and critically provide special opportunity to support livelihoods of marginalized pro-poor and women through wise use of NTFPs. Yet, the present policy formation, implementation and field reality reflect power structures and domination by certain stakeholders and interest groups (Larsen *et al.*, 2000; Upriety *et al.*, 2016). Therefore, there is a need for administrative expansion and simplification of the policy that could address the current prevailing issues and the most essential would be the formulation of a separate NTFPs Management Strategy and Action Plan.

Conclusion

Non-timber forest products are the most important provisioning services the people obtain from forest ecosystems. The importance of NTFPs in rural livelihoods and forest conservation has been well recognized as they provide income generation opportunities to millions of people around the world. Nepal is well known for NTFPs. The diverse geography and climate have rendered it a unique land of over 2,000 species of plants that are considered to be potentially useful, including food, nutrition, fibres and medicinal values. NTFPs are an important part of the Nepalese economy and they are significant sources of subsistence, income and employment to the people dwelling in forests. Due to poor economy of the rural community and lack of alternative living sources, more pressure is observed on the forest resources. The lack of NTFP resources inventory, unsustainable harvesting and lack of marketing information and capacity building, and arbitrary legislative provisions were the major challenges and constraints for sustainable management of NTFP sector in Nepal. There is a need to create effective management through sustainable harvesting and market-driven commercialization by implementing adaptive policies.

References

- Acharya, R.P. and Karki, G. (2019). Does Forest Certification Improve Socio-Economic and Governance Issues? A Case of Community Forestry from Nepal. *OAJBS*, 1(1): 20-25. DOI: <https://dx.doi.org/10.38125/OAJBS.000106>
- Amatya, S.M., Shrestha, K.R. and Cedamon, E. (2016). Nepal Forestry Handbook (Third edition). Nepal Foresters' Association, Kathmandu, Nepal.

- ANSAB (1999). Forest Products Market/Enterprise Study Report. Kathmandu, Nepal: Asia Network for Sustainable and Agriculture Bio-resources. Available online: <http://ansab.org.np/> [Accessed on 17 October 2019].
- ASEAN (2020). ASEAN Guidelines for Sustainable Harvest and Resource Management Protocols for Selected Non-Timber Forest Products (NTFPs). Authors: Guerrero, MCS, Varghese, A., Conlu, T., San Jose, D. Jakarta, Indonesia. Association of Southeast Asian Nations (ASEAN) Secretariat. Available online: <https://asean.org/storage/20.-ASEAN-NTFP-Guidelines-Final.pdf> [Accessed on 10 March 2021].
- Belcher, B., Ruiz Perez, M. and Achdiawan, R. (2005). Global Patterns and Trends in the Use and Management of Commercial NTFPs: Implications for Livelihoods and Conservation. *World Development*, 33(9): 1435-1452. DOI: <https://doi.org/10.1016/j.worlddev.2004.10.007>
- Bista, S. and Webb, E.L. (2006). Collection and marketing of non-timber forest products in the far western hills of Nepal. *Environmental Conservation*, 33(3): 244-255. DOI: <https://doi.org/10.1017/S0376892906003195>
- Chakravarty, S., Puri, A., Subba, M., Dey, T., Rai, P., Sukla, G. and Pala, N.A. et al. (2015). Value Addition of Non-timber Forest Products: Prospects, Constraints, and Mitigation. In: Sharangi, A. and Datta, S. (eds), *Value Addition of Horticultural Crops: Recent Trends and Future Directions*. New Delhi: Springer. DOI: https://doi.org/10.1007/978-81-322-2262-0_13
- DoF (2018). Hamro Ban. Annual Report of Department of Forest. Government of Nepal, Ministry of Forests and Soil Conservation (MoFSC), Kathmandu. Available online: <https://www.dofsc.gov.np/public/uploads/files/1593881065Hamro%20ban%20Report-20751.pdf> [Accessed on 9 December 2019].
- DoPR (2009). Prioritized NTFPs for Economic Development of Nepal. Ministry of Forests and Soil Conservation, Department of Plant Resources, Thapathali, Kathmandu.
- Ebrahim, N., Pravat, P., Humphreys, D. and Rayner, J. (2014). Bridging Certification and Community Forestry through NTFPs: A Case Study from Nepal. In: Cashore, B. (ed), *Forest Governance Scholarship for the Real World: Building Strategic Insights through Policy Learning*. IUFRO Occasional Paper, 24. Vienna: IUFRO, pp.13–28. Available online: <http://www.iufro.org/publications/series/occasional...> [Accessed on 3 March 2021].
- FAO (1999). Forestry: Towards a Harmonized Definition of Non-Timber Forest Products. *Unasylva*, 50(198): 63-66. Available online: <http://www.fao.org/docrep/x2450e/x2450e0d.htm#faoforestry> [Accessed on 13 September 2020].
- FAO (2000). Certification and forest product labelling: A review. FAO-Asia-Pacific Forestry Commission, eighteen sessions. Secretariat note Noosaville, Queensland, Australia, 15-19 May 2000. Available online: <http://www.fao.org/3/x5971e/X5971E.htm> [Accessed on 17 December 2020].
- FSC (2015). Global Strategic Plan 2015 – 2020. Forest Stewardship Council, Bonn, Germany. Available online: <https://ic.fsc.org/file-download.global-strategic-plan-2015-2020-english.a-621.pdf> [Accessed on 29 December 2020].
- GoN (1988). Master Plan for the Forestry Sector, Nepal: Forestry Sector Policy. Government of Nepal (GoN), Ministry of Forests and Soil Conservation, Kathmandu. Available online: <https://lib.icimod.org/record/3656/files/MpffsnSummaryoftheprogrammes63490685MIS.pdf> [Accessed on 29 December 2020].
- GoN (2004). Herbs and NTFPs Development Policy. Government of Nepal, Ministry of Forest and Soil Conservation, Kathmandu Nepal. Available online: https://www.mofe.gov.np/downloadfile/11_NTFPPolicy_1526466471.pdf [Accessed on 29 December 2020].
- GoN/MoFE (2019a). National Forest Policy 2019. Government of Nepal, Ministry of Forests and Environment (MoFE), Kathmandu. Available online: https://www.mofe.gov.np/downloadfile/Ban%20Niti_1554873640.pdf [Accessed on 29 December 2020].

- GoN/MoFE (2019b). Forest Act 2019. Government of Nepal, Ministry of Forests and Environment (MoFE), Kathmandu. Available online: <http://www.lawcommission.gov.np/en/wp-content/uploads/2021/03/The-Forest-Act-2019-2076.pdf> [Accessed on 29 December 2020].
- GoN/MoFSC (1993). Forest Act 1993. Government of Nepal, Ministry of Forests and Soil Conservation (MoFSC), Kathmandu. Available online: <http://www.lawcommission.gov.np/en/wp-content/uploads/2018/10/forest-act-2049-1993.pdf> [Accessed on 29 December 2020].
- GoN/MoFSC (1995). Forest Regulation 1995. Government of Nepal, Ministry of Forests and Soil Conservation (MoFSC), Kathmandu. Available online: http://www.forestation.org/app/webroot/js/tinymce/editor/plugins/filemanager/files/Forest_Regulation_1995%20_2_.pdf [Accessed on 29 December 2020].
- Heinen, J. and Shrestha-Acharya, R. (2011). The Non-Timber Forest Products Sector in Nepal: Emerging Policy Issues in Plant Conservation and Utilization for Sustainable Development. *Journal of Sustainable Forestry*, 30(6): 543-563. DOI: <https://doi.org/10.1080/10549811.2011.567376>
- Kandel, P. (2007). Effects of forest certification towards sustainable community forestry in Nepal. *Banko Janakari*, 17(1): 11-16. DOI: <https://doi.org/10.3126/banko.v17i1.654>
- Koba, H., Akiyama, S., Endo, Y. and Ohba, H. (1994). Name List of the Flowering Plants and Gymnosperms of Nepal. University Museum Material Reports No. 32, University of Tokyo, Tokyo, Japan. Available online: https://books.google.com.np/books/about/Name_List_of_the_Flowering_Plants_and_Gy.html?id=BGuSgAACAAJ&redir_esc=y [Accessed on 29 December 2020].
- Larsen, H.O., Olsen, C.S. and Boon, T.E. (2000). The non-timber forest policy process in Nepal: actors, objectives and power. *Forest Policy Econ.*, 1(3): 267–81. DOI: [https://doi.org/10.1016/S1389-9341\(00\)00013-7](https://doi.org/10.1016/S1389-9341(00)00013-7)
- Leakey, R.R.B. and Newton, A.C. (eds). (1994). *Domestication of tropical trees for timber and non-timber products*. MAB Digest 17. UNESCO, Paris. Available online: <https://wfp.tind.io/record/411?ln=en> [Accessed on 17 December 2020].
- Luintel, H., Banjade, M.R., Pandey, R.K. and Neupane, H.R. (2004). Issues of Sustainable Non-Timber Forest Product Management and A Way Forward. In: Kanel, K.R., Mathema, P., Kandel, B.R., Niraula, D.R., Sharma, A.R. and Gautam, M. (eds.), *Proceeding of the Fourth National Workshop on Community Forestry*. Kathmandu: Department of Forest, Pp.42-47. Available on: <http://www.dof.gov.np> [Accessed on 17 July 2019].
- Malhotra, K.C. and Bhattacharya, P. (2010). *Forest and Livelihood*. Hyderabad, India: CESS Publisher, p.246.
- Malla, S.B. and Shakya, P.R. (1995). Medicinal Plants. In: Mapuria, T.C and Kumar, R. (eds.), *Nepal Nature's Paradise*, New Edition 1999. Gwalior, India: M. Devi Publisher, pp.261-297.
- MoFE (2018a). CITES Listed Threatened Animals and Plants of Nepal. Ministry of Forests and Environment (MoFE). Department of National Parks and Wildlife Conservation, Babarmahal Kathmandu. Available online: <http://www.dnpwc.gov.np/en/reports/> [Accessed on 23 November 2020].
- MoFE (2018b). Nepal's Sixth National Report to the Convention on Biological Diversity. Ministry of Forest and Environment, Nepal. Available online: https://www.mofe.gov.np/downloadfile/6th%20NR_Bio_Diver_1576649610.pdf [Accessed on 23 November 2020].
- MoFSC (2009). The Future of Nepal's Forests Outlook for 2020. Ministry of Forests and Soil Conservation (MoFSC), Singha Durbar, Kathmandu. Available online: <http://www.fao.org/3/am250e/am250e00.pdf> [Accessed on 3 December 2020].
- MoFSC (2012). Non-Timber Forest Product Resource Inventory Guideline. Ministry of Forests and Soil Conservation (MoFSC), Department of Forest, Kathmandu. Available online: https://dofsc.gov.np/public/uploads/files/1593847620NTFP%20Guidline_Last%20Final_SGOP_Leaout_new.pdf [Accessed on 3 December 2020].

- MoFSC (2014). Nepal Biodiversity Strategy and Action Plan: 2014-2020. Government of Nepal, Ministry of Forests and Soil Conservation, Singhdurbar, Kathmandu. Available online: <https://www.cbd.int/doc/world/np/np-nbsap-v2-en.pdf> [Accessed on 3 October 2020].
- NEHHPA (2012). Major Medicinal Plants of Nepal: Identification. Nepal Herbs and Herbal Products Association, Kathmandu, Nepal. Available online: https://nepalherbs.org.np/assets/downloads/171115021205NTPF%20Book_english.pdf [Accessed on 29 October 2020].
- Ojha, H.R. (2000). *Current policy issues in NTFP development in Nepal*, Kathmandu, Nepal: Asia Network for Small-Scale Bioresources. Available online: <https://lib.icimod.org/record/10559> [Accessed on 3 December 2020].
- Olsen, C.S. and Larsen, H.O. (2003). Alpine medicinal plant trade and Himalaya and Mountain livelihood strategies. *The Geographical Journal*, 169(3): 243-254. Available online: <https://www.jstor.org/stable/3451450> [Accessed on 9 September 2020].
- Pandey, A.K., Bhargava, P. and Negi, M.S. (2011). Sustainable management of non-timber forest produce through joint forest management. *Indian Forester*, 137: 105-113. Available online: <http://www.indianforester.co.in/index.php/indianforester/article/view/12836> [Accessed on 9 September 2020].
- Pandey, A.K., Tripathi, Y.C. and Kumar, A. (2016). Non-Timber Forest Products (NTFPs) for Sustained Livelihood: Challenges and Strategies. *Research Journal of Forestry*, 10(1): 1-7. DOI: <https://doi.org/10.3923/rjf.2016.1.7>
- Pandit, B. (2008). Economics of Non-Timber Forest Production Promotion and Marketing: A case study from Malekhukhola Watershed of Dhading District, Nepal. *The Initiation*, 2(1): 145-156. DOI: <https://doi.org/10.3126/init.v2i1.2537>
- Pandit, B.H. (2003). Prospects of promoting non-timber Forest Products in the mountains of Nepal: A case study of Malekhu Khola watershed of Dhading district, Nepal. Master's thesis, Asian Institute of Technology, Bangkok, Thailand.
- Rai, R.K., Neupane, B.K. and Sapkota, K. (2019). Non-timber Forest Product and its Impacts on Livelihood in the Middle Hill: A Case of Lamjung district, Nepal. *Journal of Geography and Geology*, 11(4): 29-37. DOI: <https://doi.org/10.5539/jgg.v11n4p29>
- Rajbhandari, K.R., Rai, S.K., Bhatt, G.D., Chhetri, R. and Khatri, S. (2017). Flowering Plants of Nepal: An Introduction. Department of Plant Resources, Kathmandu, Nepal, p.432. Available online: <https://www.exoticindiaart.com/book/details/flowering-plants-of-nepal-introduction-NAP808/>
- Rijal, S., Adhikari, S. and Pant, R.R. (2019). Non-Timber Forest Products and Livelihood linkage: A case of Lamabagar, Nepal. *International Scholarly and Scientific Research and Innovation*, 13 (3): 326-333. DOI: <http://doi.org/10.5281/zenodo.2643689>
- Shackleton, C. M., Ticktin, T. and Cunningham, A.B. (2018). Non-timber forest products as ecological and biocultural keystone species. *Ecology and Society*, 23(4):22. <https://doi.org/10.5751/ES-10469-230422>
- Shanley, P., Pierce, A.R., Laird, S.A., Binnqüist, C.L. and Guariguata, M.R. (2016) From Lifelines to Livelihoods: Non-timber Forest Products into the 21st Century. In: Pancel L., Köhl M. (eds) *Tropical Forestry Handbook*. Springer, Berlin, Heidelberg. https://doi.org/10.1007/978-3-642-54601-3_209
- Shrestha, S., Shrestha, J. and Shah, K.K. (2020). Non-Timber Forest Products and their Role in the Livelihoods of People of Nepal: A Critical Reviews. *Grassroots Journal of Natural Resources*, 3(2): 42-56. Doi: <https://doi.org/10.33002/nr2581.6853.03024>
- Shrestha-Acharya, R. and Heinen, J. (2006). Emerging Policy Issues on Non-Timber Forest Products in Nepal. *HIMALAYA*, 26(1). Available online: <https://digitalcommons.macalester.edu/himalaya/vol26/iss1/12> [Accessed on 9 September 2020].
- Subedi, B.P. (2003). Non-timber forest products sub-sector in Nepal: Opportunities and challenges for linking business with biodiversity conservation. *The Nepal Journal of Forestry*, XII (2): 18-32. Available online: <https://ansab.org.np/publications/non-timber-forest-products-sub-sector-in-nepal-->

opportunities-and-challenges-for-linking-the-business-with-biodiversity-conservation [Accessed on 23 October 2020].

Subedi, B.P. (2006). *Linking Plant-based Enterprises and Local Communities to Biodiversity Conservation in Nepal Himalaya*. New Delhi: Adroit Publishers.

Subedi, B.P., Khanal, S.C. and Ghimire, P.L. (2015). Nepal: Himalayan Bio Trade Pvt. Ltd. Community-based handmade paper: a socially and environmentally responsible international business: In: Duncan, M. (ed), *Democratising forest business: a compendium of successful locally controlled forest business organisations*. Basildon, UK: Full Spectrum Print Media.

Talukdar, N.R., Choudhury, P., Barbhuiya, R.A. and Singh, B. (2021). Importance of Non-Timber Forest Products (NTFPs) in rural livelihood: A study in Patharia Hills Reserve Forest, northeast India.

Thoms, C.A. (2008). Community control of resources and the challenges of improving local livelihoods: A critical examination of community forestry in Nepal. *Geoforum*, 39: 1452-1465. DOI: <http://doi.org/10.1016/j.geoforum.2008.01.006>

Trees, Forests and People, 3 (2) 100042. DOI: <https://doi.org/10.1016/j.tfp.2020.100042>.

Upreti, Y., Poudel, R.C., Gurung, J., Chetri, N. and Chaudhary, R.O. (2016). Traditional use and management of NTFPs in Kangchenjunga Landscape: Implications for conservation and livelihoods. *J. Ethnobiology Ethnomedicine*, 12(19):1-59. DOI: <https://doi.org/10.1186/s13002-016-0089-8>

Wong, J. (2002). Biometrics and NTFP Inventory. School of Agricultural and Forest Sciences, University of Wales, Bangor, Gwynedd, UK.

World Bank (2006). Unlocking opportunities for forest-dependent people in India. Main Report No. 34481-IN. Available online: <https://openknowledge.worldbank.org/handle/10986/8416?locale-attribute=en> [Accessed on 23 October 2020].

Authors' Declarations and Essential Ethical Compliances

Authors' Contributions (in accordance with ICMJE criteria for authorship)

Contribution	Author 1	Author 2	Author 3
Conceived and designed the research or analysis	Yes	Yes	Yes
Collected the data	Yes	Yes	Yes
Contributed to data analysis & interpretation	Yes	Yes	Yes
Wrote the article/paper	Yes	Yes	Yes
Critical revision of the article/paper	Yes	Yes	Yes
Editing of the article/paper	Yes	No	No
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