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Trade Potentility and Ecological Analysis of NTFPs in Himalayan Kingdom of Nepal

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Acronyms

AEC	Agro-Enterprise Centre
ANSAB	Asia Network for Sustainable Agriculture and Bioresources
BDS/ MaPs	Business Development Service/ Marketing, Production and Services
BSP	Biogas Sector Program
CAMP	Conservation Assessment and Management Plan
CBD	Central Department of Botany
CBOs	Community Based Organizations
CEMAP	Centre for Medicinal and Aromatic Plants
CERPA	Centre for Research Planning and Action
CFs	Community Forests
CFUGs	Community Forest User Groups
CITES	Convention on International Trade of Endangered Species
DDC	District Development Committee
DFO	District Forest Office/Officer
DG	Director General
DoF	Department of Forest
DPR	Department of Plant Resources
EFEA	Environment and Forestry Enterprise Activity
EPA	Environment Protection Act
EPR	Environment Protection Regulation
FECOFUN	Federation of Community Forestry Users, Nepal
FNCCI	Federation of Nepalese Chamber of Commerce and Industries
FRIS	Forest Resource Information System Project
FY	Fiscal Year
GDP	Gross Domestic Production
GM	General Manager
GOs	Governmental Organizations
GoN	Government of Nepal
HNCC	Herbs and NTFPs Coordination Committee
HNDP	Herbs and NTFPs Development Policy
HPPCL	Herbs Production and Processing Company Limited
ICIMOD	International Centre for Integrated Mountain Development
INGOs	International Non Governmental Organization
IOF	Institute of Forestry
IPR	Intellectual Property Rights
ITC	Indian Trade Centre
ITTO	International Tropical Timber Organization
IUCN	International Union for Conservation of Nature
JABAN	Jadibuti Association of Nepal
LF	Leasehold Forestry
LI-BIRD	Local Initiatives for Biodiversity, Research and Development
MAPDON	Medicinal and Aromatic Plant Data Base of Nepal
MAPPA	Medicinal and Aromatic Plants Program in Asia
MAPs	Medicinal and Aromatic Plants
MFSC	Ministry of Forests and Soil Conservation
MIS	Market Information System

MLD	Ministry of Local Development
MoAC	Ministry of Agriculture and Cooperatives
MoEST	Ministry of Environment, Science and Technology
MoF	Ministry of Finance
MoICS	Ministry of Industries, Commerce and Supply
MoLJPA	Ministry of Law, Justice and Parliamentary Affairs
MPFS	Master Plan for Forestry Sector
MT	Metric Tons
NARC	Nepal Agricultural Research Council
NEHHPA	Nepal Herbs and Herbal Products Association
NGOs	Non Governmental Organizations
NMPB	National Medicinal Plants Board
NP (BZ)	National Park (Buffer Zone)
NPC	National Planning Commission
NSCFP	Nepal Swiss Community Forestry Project
NTFPs	Non Timber Forest Products
OPs	Operational Plans
R&D	Research and Design
RONAST	Royal Nepal Academy of Science and Technology
SAFE-Concern	Socio-economic Agro-Forestry and Environment Concern
SDC	Swiss Development Cooperation
SNV	The Netherlands Development Organization
T.U.	Tribhuvan University
VDC	Village Development Committee
WHO	World Health Organization

Abstract

Non-timber Forest Products (NTFPs) have been welfare, subsistence or livelihood commodity since long; these are traditional source of food, fiber, medicine, etc. In some rural hilly areas, it contributes up to 50 % of total annual family income. NTFPs sub-sector in Nepal contributes about 5 % of national GDP out of total estimation of about 15 % from the whole forestry sector (almost 1/3). More than 100 types of plant species are harvested from the wild and traded to international market mostly to India; 95 % of the NTFPs are collected from the wild and 90 % are exported to India in raw form. Amala, Atis, Chiraito, Tejpat, Guchhi chyau, Jatamansi, Jhyau, Kutki, Pipla, Ritha, Sugandhawal, Sugandha Kokila and Timur are the major NTFPs in such trade to India.

The importance of Medicinal & Aromatic Plants (MAPs) has increased progressively over the last two decades. Herbal remedies are increasingly becoming mainstream consumer products manufactured by multinational companies amongst other, and sold in super market chains and in a variety of other outlets, globally. Food supplements, cosmetics, fragrances, traditional cuisine, dyeing and coloring agents are just a few of the application where medicinal, aromatic and dye plants are finding increasing use by the day. As a result there is growing demand of Nepalese MAPs and other NTFPs for these purposes.

The diverse geography and climate of Nepal has rendered it a unique land of NTFPs along with other natural resources. However, the commercial exploitation without any conservation measures has threatened many species. The high mountains are highly praised for high value (potency) low volume NTFPs, hence they fetch higher prices. In spite of all advantages, the country is not able to harness the full potential of NTFPs for the welfare of Nepalese. The major constraints for such situation are considered to be low capital investments both by the government and private sectors for the overall promotion of NTFPs including enterprise development and the perpetual marketing of quality products; government's unclear investment policy, lack of proper documentation on species availability (including bio-prospecting) & uses and poor awareness among public on its values.

The study was initially conceived to identify ten important NTFPs, but in the course of the study during the various interaction programs organized for feedbacks, participating stakeholders suggested the

study team that rather than limiting the selection to only ten species, it might be preferable from investment point of view to relax the restriction and consider more species for practical reasons. So, the study now endeavors to prioritize and recommend four species of MAPs and other NTFPs for promotion via private sector investment in each of the three climatic zones of Nepal from the list of 30 species already selected by the national level Herbs and NTFPs Coordination Committee (HNCC) of GON and additional four species viz. Bel, Chamomile, Lemongrass and Mentha selected by the study team by considering high potential for their promotion based on professional experience, market demands and the suggestions received from various stakeholders. The study identifies the top priority species from among the priority species designated by HNCC and additional four species are also recommended for promotion by team based on their prospects for low risk investment by private sector toward commercial promotion of NTFPs. Species prioritization for commercial promotions has been attempted by considering practically applicable criterion like market value, export data, ease of cultivation, parts used in trade, range of distribution of species, threat category, status of legal protection, local processing opportunity, ethnobotanical importance, etc. A total of 17 new criteria are developed by the study team by further illuminating and simplifying the criteria already set by HNCC, Nepal and also reviewing the criteria set earlier by National Medicinal Plant Board (NMPB), India. Moreover, the prioritization criteria of other related development organizations like NSCFP, SNV, ANSAB, BDS MaPs, etc have also been thoroughly reviewed and developed criteria with proper justification to attain the set objectives.

Objectives of the study

This study was aimed to invite the private investors (national and international) in the overall promotion of MAPs and other NTFPs of Nepal by indicating the socio-economic and environmental opportunities available to participate in such venture. General objective of the study is to compile and prioritize 10 NTFPs out of the already prioritized 30 species by GoN/DPR for making concerted efforts on commercial promotion.

The specific objectives were as follows:

1. Screen out the top 10 NTFPs (representing at least 3 to each of Terai, Mid hill and Himalaya) by reviewing existing policy and the criteria for commercial promotion
2. Further, compile information on sustainable harvesting, commercial and marketing aspects
3. Recommend appropriate measures for sustainable supply of the identified NTFPs with their market promotion.

Prioritization criteria set by NMPB and HNCC for promotion of NTFPs

National Medicinal Plants Board (NMPB) of India, functioning similar to the HNCC of Nepal, has launched promotional and commercial schemes for all kinds of stakeholders. These schemes include production of quality planting material, conservation, inventorisation, R&D, extension, value addition, semi-processing, marketing, etc. The NMPB has also prioritized 32 medicinal plants at the national level with a view to develop and promote them more intensively. The criteria for the prioritization and selection of species are grouped into five broad categories based on high value in local uses, suitable to local agro-ecology and farming system, processing technology known to capture part of the value addition, wide distribution and ease in availability of genetic materials, and importance in genetic resources/biodiversity conservation.

The HNCC has compiled a list of 30 species of MAPs and other NTFPs for research and development. The species are prioritized based on 8 principal criteria viz. (i) highly demanded commercial sps (ii) species having high market price (iii) having potential for domestic value addition (iv) species available over wide geographical range (v) species harvestable in short rotation period (vi) land fertility requirement for species (vii) species importance in local ethnobotany and (viii) species conservation status. Most of the criteria set by HNCC are common to that of NMPB. The common species in both prioritizations are Atis, Kurilo, Jatamansi, Kutki, Amala, Chiraito, Gurjo, Pipla and Sarpagandha, thus indicating the importance of these species for overall promotion in social, economic and ecological context of both the countries.

Additional criteria used by other development organizations such as SNV and SDC/ NSCFP have also been reviewed in the study. SNV has utilized criteria such as market/ economy (price, chain, level,

demand and supply), resource management environment (availability, sustainable harvesting), social institutional provisions (policy, legislation, conventions, treaties) and science/ technology (agro-technology, scientific advancement, processing for value addition) in ranking the species for promotion. SDC/ NSCFP looks for ecology (resource status), market, technology and legal provisions before undertaking promotional activities for any NTFP species.

New sets of criteria developed for this study

All together 17 sets of criteria has been used in this study while selecting topmost commercial species for each of the three climatic zones viz. Terai, Mid-hill and High mountain of Nepal. Market price, past annual export quantity records of Department of Forestry (DoF), average annual export as per Indian Trade Centre (ITC) Tanakpur, annual industrial demand in Kathmandu and royalty of the species as % of market price has been some of the quantitative criteria for the prioritization of the species. Other qualitative criteria used for this purpose are ease of cultivation (propagation, domestication, tissue culture), parts used in trade, bulkiness in transportation, range of distribution (horizontal and vertical), threat category/ conservation status, legal framework for protection (CITES, GoN), availability of local processing (existing) techniques, regeneration/ rotation periods, ethno-botanic importance, potentiality of further processing for value addition, social acceptance for promotion and possibilities of quality improvement.

A ranking score has been assigned to each of the 30 preferential species of HNCC and additional four species (viz. Bel, Chamomile, Lemongrass and Mentha) considered for the study against each of the 17 criterion based on professional experience of experts involved in the study and suggestions received from key informants. The score has been kept in the range of 1-5 for each criterion, giving highest (5) to most favorable and lowest (1) to unfavorable. For example: for trade volume, industrial demand and collection or export quantity (as per transit or collection permit issued by DFO) the scores are assigned by categorizing the volume/ quantity into five echelon as Maximum, High, Medium, Low and Least and putting forth the scores as 5 to Maximum; 4 to High; 3 to Medium; 2 to Low; and 1 to Least. Similarly, for existing cultivation/ domestication: 5 to Large scale; 4 to moderate scale; 3 to low scale; 2 to recently started; and 1 to no more practice.

Background

The diverse geographic and climatic variations of Nepal ranging from tropical climate of Terai to alpine tundra of high Himalaya and the blending of several eco-regions (six floristic provinces) in the country occupying central one-third length of Hindu Kush-Himalaya has pleasantly furnished with vast treasury of Non-Timber Forest Products (NTFPs). In Nepal, all forest products, except timber, fuelwood, and fodder are considered as Non-Timber Forest Products (NTFPs). NTFPs, especially Medicinal and Aromatic Plants (MAPs), have been identified as one of the potential high value commodities in the recent years. Of the present total contribution by the forestry sector of approximately 15 % to the national GDP (Banko Janakari, 2004), NTFPs are estimated to contribute about 5% in Nepal's GDP (Malla et al, 1995; ANSAB, 1999). NTFPs are also integral part of rural socio-economy in Nepal as majorities of people depend on it for healthcare, subsistence and as means of income. In some rural hilly areas, collection and trade of MAPs contributes up to 50 % of total annual family income of the primary collectors. Over the last two decades, the importance of MAPs and other NTFPs has been increasingly recognized as a key component of health care, biodiversity conservation and people's livelihood. The expanding global demand for natural products for health care as well as food and cosmetics resulting loss of wild NTFPs, may have far reaching implications to rural communities who are often highly dependent upon them for their health and economic benefits derived from harvesting and trade. Medicinal plants constitute 80 % of raw material for preparation of traditional drugs. They contribute at least 25 % (Rawat and Karki, 2004) in modern drugs also. Almost 90 % of world population relies on plant-based medicines for primary healthcare and over 120 compounds from 90 plant species are available as prescription drugs. Asian and Europe markets dominate worldwide sales of plant based

medicinal products, average around US\$ 20 billion a year (Gruenwald, 1999). However, any single medicinal plant product is unlikely to generate sales of more than a few hundred million dollars and most sales for less than US\$ 10 million per year (Laird and Guillen, 2002). Most individual NTFPs have relatively small annual turnover.

Poor, women and various ethnic groups form the bulk of the collectors and users of NTFPs/MAPs for their livelihood support; these groups have increasingly been struggling with strong competition due to the growing market and interest of newcomers in MAPs collection (Sharma and Das, 2004). The inaccessibility, marginality and fragility of high land have fostered local inhabitants to depend on locally available resources for survival, leading to an extremely rich indigenous knowledge of resources such as medicinal plants. Thus, NTFPs are important in local and regional markets and for subsistence use, with communities who live in and around forests often relying upon a range of products with economic, medicinal and cultural value. The international demands of MAPs in pharmaceutical and botanical medicines, food and flavoring items, cleaning products, insecticides and other industries require intensive management in wild and commercial domestication (i.e. *ex situ* cultivation) at the same time.

The diverse geography and climate of Nepal has rendered it a unique land of NTFPs. A proper documentation of Nepalese medicinal plants is still lacking. Experts estimate that 700 to 1700 species of MAPs occur in Nepal (Tiwari et al 2004); however the Department of Plant Resources (DPR) has recorded just 690 species of MAPs. The Medicinal and Aromatic Plant Data Base of Nepal (MAPDON) has listed 1624 species having ethno botanical importance (Shrestha et al, 2000) thus increasing the number of plant species with ethnobotanical values. Rawal 2004 (as cited from Malla and Shakya, 1984) mentions that the flora of Nepal contains about 1000 economic plants (14% of the vascular plants of the country) including 440 species of wild food plants, 71 species of fiber yielding plants, 50 species used as fish poison, 30 species of fodder yielding trees. Among these, about 100 species of MAPs are currently exploited for commercial purposes. Edward (1996) has also mentioned about harvesting more than 100 species of NTFPs from mid-hills and high mountains of Nepal that are mostly traded to Indian markets. In terms of distribution pattern of MAPs, Nepal's tropical region (below 1000 m) holds 49 % of them, subtropical region (1000-2000m) 54 %, temperate region (2000-3000m) 36 %, sub-alpine region (3000-4000m) 18 % and alpine region (above 4000m) holds 7 % (Malla and Shakya, 1986). The high mountains are highly admired for high value (potency) but low volume NTFPs, hence fetching higher prices. However, Nepal has not been able to adequately utilize them. General lack of sustainable production practices, inappropriate harvesting and post-harvest practices, product adulteration, in appropriate value addition, poorly organized marketing information system, and lack of standardized production system has hindered international recognition of Nepali NTFPs as major challenges to maximize equitable economic returns. The existing support services such as communication, storage, organization, transportation, and credit facilities are also the added challenges of NTFPs marketing system in Nepal. Further, NTFPs collectors, traders and other categories of entrepreneurs are discerned to be harassed by the prevailing system of multiple taxes/ levying at local levels, insufficient duration of collection and transport permits, high royalty rates, cumbersome IEE/EIA provisions, insufficient manpower to identify/certify the products (whether from sustainably managed source, organic, etc), undesignated authority to certify the products as food supplement and so forth.

Recently, concerns have been expressed about the erosion and degradation of NTFP resources, un-sustained availability of quality raw materials, high and fluctuating prices, improper marketing, and lack of organized cultivation and secretive nature of trade; but still the share of NTFPs in the export market is significant. Various actions have been attempted both by the government agencies and national and international conservation and development organizations to find solutions so that these resources can be harvested and used sustainably. Attempts so far have often been isolated and sometimes not based on a

systematic analysis of the conditions needed for success. Situations in which the resources are being managed are often very complex since they are related to a web of interrelated ecological, socio-economic, cultural and political factors.

Despite of increasingly recognized economic potential of NTFPs, yet neither the MAPs dependent communities nor the state have been able to make the best out of this sector. However, the government has shown interest towards promotion of NTFPs since the promulgation of the Master Plan for Forestry Sector (1989) and many other policies and guidelines have been formulated thereafter. The Master Plan is still the basic document in formulation of forest policies as envisaged in the Ninth (1997-2002) and the Tenth (2002-2007) Five Year Plans. The Tenth Five Year Plan has also emphasized production, processing and marketing of medicinal plants and other NTFPs in a private-public partnership basis. In this direction, the government has also established a high level “Herbs and NTFP Co-ordination Committee (HNCC)” to help formulating appropriate national policy, strategies, laws and other legal mechanism to effectively launch the program on conservation and utilization of NTFPs. The committee, set within the framework of DPR, also provides technical and other supports to the concerned traders and entrepreneurs, and provides a platform for coordination among government agencies and stakeholders for information sharing both at national and international level. Recent achievements in policies favoring development of NTFPs sub-sectors in Nepal have been the Herbs and NTFP Development Policy (HNDP, 2004) and the amendment (2005) in the forest regulation to revise the royalty rate of NTFPs. As per the recently promulgated HNDP, HMGN has set strategies for (i) building capacity of GOs/ NGOs working responsively in NTFP sub-sector (ii) establishing and developing Ayurvedic and pharmaceutical industries within the country (iii) inviting private and foreign investment for establishment of advance and large scale industry based on locally available NTFPs (iv) promoting traditional knowledge and skills through micro and medium scale industries by domestic investor (v) emphasizing scientific storage, processing, packaging, and chemical extraction works of highly potential NTFPs.

The HNCC has prepared a list of 30 commercially valuable indigenous MAPs for domestication research purposes with a view to harness the full potentials of the resources that are already in use for various reasons. HNCC have prioritized the 30 sps based on eight principal criteria viz. (i) commercial demand (ii) market price (iii) domestic value addition potential (iv) geographical range of distribution (v) rotational period for product harvest (vi) land fertility requirement (vii) ethno-botanical importance and (viii) conservation status. Many other development organizations and projects like SNV (the Netherlands Development Organization), ANSAB (Asian Network for Sustainable Agriculture and Bio-resources), NSCFP (Nepal Swill Community Forestry Project) and others have also prioritized NTFPs of their working area based on few criteria such as favorable policy, availability of technology, ecological distribution, resource sustainability, socio-cultural acceptability, market access and value, contribution in poverty reduction, technological and financial viability, etc.

The study is targeted towards prioritization of top ten species of NTFPs comprising atleast 3 from each of the three climatic zones viz. Terai, Mid-hill and High Mountain of Nepal.

The study aims at identifying the top 10 priority species from among the 30 priority species designated by HNCC and the additional top four species based on new set of criteria developed for this purpose. This study also endeavors to prioritize and recommend atleast 3 species to each of the three climatic zones of Nepal for promotion via private sector at low risk investment. The four extra species viz. Bel, Chammomile, Lemongrass and Mentha, being subjected for valuation along with the list of 30 species of HNCC, are selected by the study team considering the high potential for their promotion based on professional experience, market demands and the suggestions received from various stakeholders during consultation process.

Why 10 Species?

To expand and strengthen market oriented private sector driven agro enterprises in order to increase the value and volume of high-value products sold domestically and internationally. It is now required to make precise identification of commercially viable few species for luring investors. Promoting only 10 species from the list of 30 species prioritized by DPR to understand the outcome from industrial promotion; as it is cumbersome to promote many species simultaneously. Once the 10 species are prioritized they will be sustainably managed, value added suitably and marketed properly within and outside the country.

Methodology of the study

The study is largely based on desk-study with extensive use of secondary sources. Some additional consultations with professional experts, research institutions, non-governmental organizations (e.g. ANSAB, JABAN and BDS MaPs), processing companies and private entrepreneurs (e.g. Dabur Nepal and Gorkha Ayurveda) have also been made in order to supplement the information collected through secondary sources. As far as possible, the species prioritization for commercial promotions has been attempted by considering practically applicable criteria. A total of 17 new criteria are developed by the study team by further illuminating and simplifying the criteria already set by HNCC and also reviewing the criteria set earlier by National Medicinal Plant Board (NMPB), India. Moreover, the prioritization criteria of other related development organizations like NSCFP, SNV, ANSAB, BDS MaPs, etc have been thoroughly examined to attain the set objectives with proper justification.

Amongst the various factors, economic benefit is considered as one of the strongest driving force in motivating the farmers/ local communities towards NTFPs conservation, management and enterprise development. Local communities would show interest towards management and sustainable use of NTFPs by undertaking cultivation of viable species in communal lands, degraded forests and around the homesteads and wastelands if they understand the social, economic and ecological benefits from such venture.

Review of NTFPs prioritization criteria set by various institutions

The HNCC has compiled a list of 30 species of MAPs and other NTFPs for research and development. The species are prioritized based on 8 principal criteria viz. (i) highly demanded commercial sps (ii) species having high market price (iii) having potential for domestic value addition (iv) species available over wide geographical range (v) species harvestable in short rotation period (vi) land fertility requirement for species (vii) species importance in local ethnobotany and (viii) species conservation status. Most of the criteria set by HNCC are common to that of NMPB. The common species in both prioritizations are Atis, Kurilo, Jatamansi, Kutki, Amala, Chiraito, Gurjo, Pipla and Sarpagandha, thus indicating the importance of these species for overall promotion in social, economic and ecological context in both the countries.

NMPB of India, functioning similar to the HNCC of Nepal, has launched promotional and commercial schemes for all kinds of stakeholders. These schemes include production of quality planting material, conservation practices, inventorisation, R&D, extension, value addition, semi-processing and marketing aspects. The NMPB has also prioritized 32 medicinal plants at the national level with a view to develop and promote them more intensively. The criteria adopted by NMPB for the prioritization and selection of species are grouped into five broad categories based on high value of species in local uses, suitable to local agro-ecology and farming system, processing technology known to capture part of the

value addition, wide ecological distribution and ease in availability of genetic materials, and importance in genetic resources/biodiversity conservation.

Additional criteria used by other development organizations such as SNV and SDC/ NSCFP have also been reviewed in the study. SNV has utilized criteria such as market/ economy (price, chain, level, demand and supply), resource management environment (availability, sustainable harvesting), social and institutional provisions (policy, legislation, conventions, treaties) and science/ technology (agro-technology, scientific advancement, processing for value addition) in ranking the species for promotion. SDC/ NSCFP looks for ecology (resource status), market, technology and legal provisions before undertaking promotional activities for any NTFP species.

New sets of criteria developed for this study

The study team felt some inconvenience while recommending few top species from the priority lists of HNCC and NMPB since some of the criterion set by both the institutions seems too general and needs further elaboration to satisfy the entrepreneur for their investments. Hence, the research team has carefully and specifically reviewed these criteria and put forth very practical and experience based sets of criteria, some of which may have stem from one general criterion. A set of prioritization criteria have been stipulated by the study team after consolidating the views of stakeholders consulted during the study. Altogether 17 criteria have been used in evaluating top commercial species by further clarifying and simplifying the criteria already set by HNCC, SNV, NSCFP and NMPB, India. Market value/ price, annual collection/ export quantity record of DoF (to reflect export potential of the resource signifying its abundance for sustainability), annual industrial demand in Kathmandu, royalty of the species as percentage of market price, average annual export as per Indian Trade Centre (ITC) Tanakpur have been some of the quantitative criteria for the prioritization. Other qualitative criteria used in the study are ease of cultivation/ domestication (i.e. availability of technology for resource conservation), parts used in trade, bulkiness, range of distribution (horizontal and vertical), threat category (or conservation status), legal protection, availability of local processing techniques, regeneration status/ rotation period, ethno-botanic importance, potentiality for further processing, social acceptance for promotion and quality improvement for selection of commercial species to ensure their perpetual supply.

The scoring and ranking process

For each species appropriate score in whole number from 1 to 5 is given under each criterion. The highest score (5) is assigned to the most favorable characteristic and lowest (1) to the unfavorable. For example: for trade volume, industrial demand and collection or export quantity (as per transit or collection permit issued by DFO) the scores are assigned by categorizing the volume/ quantity into five echelon as Maximum, High, Medium, Low and Least and putting forth the scores as 5 to Maximum; 4 to High; 3 to Medium; 2 to Low; and 1 to Least. Similarly, for existing cultivation/ domestication: 5 to Large scale; 4 to moderate scale; 3 to low scale; 2 to recently started; and 1 to no more practice.

Limitations of the study

The study is primarily an outcome of literature review and consultation with limited number of key informants of Kathmandu valley (especially DPR, DoF, HPPCL, FNCCI, Singh Durbar Bidhyakhana, ANSAB, NEHHPA, Dabur Nepal, and BDS MaPs) and few from outside such as Jadibuti Association of Nepal (JABAN) based at Nepalgunj and NTFP entrepreneurs of Jumla. The information gathered in this study through consultation with the narrow sphere of stakeholders' may not truly reflect the view of primary collectors, or growers or the rural traders as the circle of stakeholders is very large and complex which may have been approached through rigorous and time consuming processes.

Findings

Nepalese NTFPs are increasingly recognized because of their significant role in the rural livelihood and biodiversity conservation. NTFPs have huge potential to be a reliable source of income for the rural people for their subsistence and also for government's revenue to aid in the poverty reduction goal of the country as clearly mentioned in the 10th five year plan. Because of insignificant programs/ budget, poor research, inadequate expertise, ecological isolation of resource, improper management, poor policy implementation, feeble monitoring mechanism, and other social and institutional barriers, the resources are degrading seriously in many cases. The general lack of design principles of appraising, implementing and monitoring resource management systems in the country is hindering entrepreneurs for investment in the sector as knowing resource status is must for sustainability of the venture. The domestication and management operations of NTFPs are not getting momentum because of unavailability of adequate technical, financial and material support to forest users or farmers. Collectors or farmers in many cases are not aware of the true values of NTFPs and those who know actual value are not getting appropriate price for their product in absence of market information. Traders are normally reluctant to disclose trade secret to producers or collectors. Further, storage, transportation and quarantine problems are noticed to harass NTFP entrepreneurs either due to loss or high cost and time involved. Many other hindrances prevail on the ground for NTFPs management, transaction or enterprises. The evident issues include excruciating local taxes (eg by DDC, VDC, Check-posts all after DFO revenue) at various points, high royalty rates compared to market price, the cumbersome process of IEE/EIA in obtaining collection license for high quantities (above 5 metric tons) and insufficient or untrained manpower of DFOs to certify sustainably harvested products or affix perpetually harvestable quotas or ascertain products type/ category. Forest product certification mechanism is greatly felt by foresighted resource managers to extend the products market to developed countries to fetch higher price. Organized marketing through approaches such as cooperative society or export of secondary products by local level processing in many cases, especially for high altitude products, have shown promising benefits for collectors, traders and entrepreneurs. Such efforts have proven advantage by many folds that provide bargaining power to collectors, generate bulk mass for commercial activities, reduce the burden of transport by individual, as well as involve the locals in value addition and income generation. Lack of knowledge to collectors for product harvesting in many cases has found to pose severe impact for the resource regeneration, product damage and after all the least prices. The general practice among poorly motivated collectors is to gather maximum quantity from smaller area, often as a subsidiary business during cattle grazing, without taking care of rotation period, harvestable quantity, and they also tend to make adulteration by adding similar items to higher volume and more money. This practice may be associated with the reality that some traders do not distinguish the grades of the products and give same price to all grades. Such attempts are sure to fade the resource and blemish the recognition of the products in the market. Capacity building trainings to primary collectors on *in situ* or *ex situ* conservation, products harvesting, handling, processing and marketing with side by side close monitoring of harvesting and management regimes by the

concerned stakeholders is necessary for the resource sustainability of any NTFPs and to reap benefit there from for local livelihood support.

Government policy framework and initiatives towards NTFP promotion

Several policies, development plans, acts and regulations may require periodic review and revision that often wrangle to each other in regulating and managing NTFP resources for people's subsistence and commerce. The following have been the milestones in policy arrangement of the country encouraging promotion of NTFP resources: The Master Plan for the Forestry Sector, 1989; Industrial Enterprises Act, 1992, the Ninth and Tenth Plan of the Forestry Sector, 2059-2064 BS.

Acknowledging the sprits of Tenth Five Year Plan, the govt. has established HNCC (2002) under the chairmanship of Hon. Minister for Forests and Soil Conservation as milestone in NTFP sub-sector promotion and put forth various mandates on it including functions to serve as forum for producers and buyers to make them aware of technical know-how and existence of the potential market.

Herbs and Non-timber Forest Products Development Policy (2004) is the new policy developed by HNCC (2002) for overall promotion of NTFPs sub-sector in Nepal. The policy framework is considered innovative to investors for management and sustainable utilization of NTFP resources. The policy has envisioned several initiatives in favour of producers as well as traders and has also sought investment from private sectors. The government took some initiatives immediately after the policy formulation. These initiatives are revision on royalty rate of MAPs and other NTFPs produced from private land, revision of royalty for some NTFPs in line with market price of the products; and provision for bank loan facilities to farmer/ entrepreneur. The existing rate of Yarchagumbu (*Cordyceps sinensis*) has been reduced from NRs. 20 000.00 to NRs.10 000.00 per kg. Similarly the royalty rates of many other species like Tej patta (*Cinnamomum tamala*), Sal-ko-pat (*Shorea robusta*), Dhasingare (*Gaultheria fragrantissima*), Amala (*Phyllanthus emblica*) and Masala (*Eucalyptus* sps) has been heavily reduced. Likewise, a taskforce, formed with a view to suggest the government in completely relaxing the royalty of the products obtained from cultivation in private land, is working very seriously to facilitate the process. Likewise, uplifting of the ban on Kutki (*Neopicrorhiza scrophulariiflora*) by GoN is another step favorable for enterprise development from the high value medicinal plant that is available in the high mountains. The conservation status of this species is carefully reviewed and recommended to uplift ban for the resource harvested from sustainably managed forest. To safeguard perpetual supply of raw materials to the entrepreneurs in the country as well as to meet the international demand, the government has recently recommended for resource assessment of five highly valuable NTFPs like Lothsalla (*Taxus baccata*), Kutki (*Neopicrorhiza scrophulariiflora*), Panchaule (*Dactylorhiza hatagirea*) Yarchagumba (*Cordyceps sinensis*) and Timur (*Zanthoxylum armatum*). Likewise, the Karnali Zone is declared as "Pocket of Excellence" by GoN for the overall development of NTFPs, particularly high value medicinal plants. All these proactive policies and steps taken by the government are highly appreciated by all involved in the sub sector.

Selection/ ranking of primary priority species

The 30 indigenous species prioritized by GoN/DPR/HNCC are important and valuable for promotion in long run. Their promotion and standardization is important for international recognition of Nepali NTFPs. This study has tried to select some (12) high priority species from the prioritized list of HNCC considering the interest of private sector for their

investment. The study in no way try to undermine the priority species of HNCC but added other four species (viz. Bel, Chammomile, Lemongrass and Mentha) to the list of 30 sps for review and verification subjecting to scoring to each species under the set of 17 selected criteria. Thus, the priority species explored here can be considered as first priorities from private sector viewpoint. The justifications for the selected 12 priority species was on ecological, domestication and market status.

Domestication and Cultivation

Nepal is uniquely endowed with a wide variety of indigenous NTFPs. Diverse range of NTFPs found in abundance in Nepal are known to provide basic health care needs as well as critical livelihood support to the rural and marginalized communities living in fragile ecosystems of the country. Bulks of NTFPs utilized by rural people either for daily subsistence or for economic benefits are still mostly harvested from the wild source. However, a large number of NTFPs can be cultivated in Nepal because of the wide variety of climatic conditions. The expanding and exploitive nature of trade for some species has posed serious challenges to their survival and their habitats too are suffering severely. Recently, some of the conservation and development organizations, mostly of NGOs and GOs, have shown interest towards domestication and cultivation of NTFPs for their commercial promotion. Cultivation in the developing word is the only alternative to reduce the risk of some sps becoming extinct and complement the ecological deterioration. Furthermore, having an additional source of income from NTFPs cultivation would discourage encroachment on marginal forestland for agriculture and unsustainable NTFP collection practices.

Agriculture is the primary occupation of people in Nepal with relatively small land holding combined with low productivity, adverse climates, and lack of skilled people for best practices in managing agriculture. 83 % of the country's area harbors mountainous landscape with high hills and Himalayas that inhabit high quality NTFPs. In this context, cultivation and use of NTFPs in general and MAPs in particular have a great potential to support rural poverty and conservation of mountain forests. However, successful involvement of farmers/communities in the management and commercialization of NTFPs can only be achieved if carefully approached and profit motives are provided sufficiently to overcome inherent risks. In fact, farmers involve in cultivating NTFPs on their farm if they see such cultivation practice is remunerative i.e. they would seek technical and material support as well as buy back guarantee at their anticipated price. The cultivation practice of Chiraito, Timur, Alaichi, Ritha, Tejpat/Dalchini, Mentha, Lemongrass, Chamomile, Lauth salla, Sugandhwal, Amala, Bojho, Jangali Sayaptri, Bamboo, Rattan, etc are already in vogue at many places in Nepal. Cultivation of threatened and other valuable species are certainly warranted, even though we do realize that the potential benefits will reach to a populace possessing limited land, labor, capital and time, at a slower pace. Although a number of species are being promoted in Nepal, many are on trial stage or under action research for domestication. Some principal species under cultivation in Nepal are: Chiraito, Sugandhawal, Kurilo, Timur, Lauth salla, Tejpat, Ritha, Amala, Bojho, etc. It is obvious that farmers charmingly than the species requiring sophisticated technology will adopt species requiring easy cultivation and propagation techniques. Hence, farmers first seek to have information on input cost, benefits, and availability of technology for cultivation, market potentials, and other risks involved. Considering the scale of domestication/ cultivation and availability of planting materials and propagating technologies including tissue culture, the scoring of the selected 34 species are made in [Annex 1](#) Although very limited information on cultivation economics of commercial NTFPs exist in Nepal, information on some relevant species are compiled and presented in the [Annex 2](#).

Tiwari, *et al* (2004) has made an estimate for potential benefits from plantation of few MAPs as shown in the Table 1 below. However, the information is site specific and may not be representative to other parts of the country.

Table 1: Potential economic benefits from MAPs plantations by species

Species	Estimated production (kg/ plant)	Total production (kg)	Sales price (NRs.)/year	Gross Income ('000NRs)	Remarks
Amala (<i>Phyllanthus emblica</i>)	9	99,414	7	7695.90	After 7 years of plantation
Bojho (<i>Acorus calamus</i>)	0.15gm to 0.25gm	1,095	27	29.56	After 2 years of plantation
Chiraito (<i>Swertia chirayita</i>)	0.2	1,000	120	120,000	After 3 years of plantation
Ritha (<i>Sapindus mukorossi</i>)	30-45	198,840	8	1590.7	After 7 years of plantation
Sugandha Kokila (<i>Cinnamomum glaucescens</i>)	55-60	36,080	55	1984.4	After 7 years of plantation
Tejpat/ Dalchini (<i>Cinnamomum tamala</i>)	25 Leaves 12 Barks	749,750 359,880	25 10	7497.5 8,997.0	After 6 years; After 10 years of plantation
Timur (<i>Zanthoxylum armatum</i>)	1.5-2	336	95	31.9	After 7 years of plantation

Source: Tiwari, *et al* (2004)

The principal cultivators of NTFPs at organizational level in the context of Nepal have been HPPCL, Dabur Nepal, Gorkha Ayurved, Mahendra Sanskrit University, Sambala Herbal, Male International, etc. Most of these organizations have been promoting commercial promotion of MAPs. Organic productions of MAPs hold good promises in Nepal, as the country is organic by default.

Collection, Export and Revenue

People, particularly in rural and remote areas of Nepal are heavily involved in collection of NTFPs for subsistence of their livelihood. MAPs provide benefits to many people, both collectors and traders. Most of the collectors gather MAPs from the wild and only few cultivate some of the species in their private lands. More than 100 types of NTFPs that are used in medicinal, aromatic and other industrial preparations are collected in Nepal for commercial purposes. More than 90 % volumes of the commercial NTFPs are collected from wild very often in the destructive and unsustainable manner. Figures estimate almost 80% of the raw material procured by the companies comes from wild sources; and exploitation of natural resources takes place to the point of danger for certain species. Higher price and urgent requirements from traders sometimes cause uprooting of some species, hence jeopardizing future outputs. MAPs collection is basically considered an additional or leisure activity; however, collection of some of the species requires hard works. Collectors in very often utter for lesser price in some species as compared to the labor, risk and time involved.

Principal NTFPs by ecological zones:

NTFPs/MAPs of High Altitude: Jatamansi, Kutki, Atis, Bis jara, Bishma, Nirmasi, Dhupi, Nagbeli, Padamchal, Panchaule, Yarsagumba, Silajeet, Gucchi chyaw, Somlata, Satuwa, Sunpati, Laghupatra, Sugandhawal, Seabukthorn, Olive, Deodar, etc

NTFPs/MAPs of Mid Hill: Timur, Tejpat/ Dalchini, Chiraito, Pakhanbed, Loth salla, Rudraksha, Kachur, Ritha, Majitho, Titepati, Dhaturu, Kuchila, Asuro, Sugandha Kokila, Indrayani, Bojho, Ban Lasun, Ghu Kumari, Thulo Okhati, Bhyakur, Allo, Lokta, Jhyau, Alaichi, etc

NTFPs/ MAPs of Terai: Harro, Barro, Amala, Satawari, Sikakai, Sarpagandha, Pipla, Tetepati, Khayar, Asuro, Bhyakur, Banmara, Gurjo, Bel, Rajbrikchha, Jiwanti, Dhaturu, Ghodtapre, Kantakari, Neem, Bet, Chhatiwan, Musli, etc

The commercial medicinal plants in the Terai region can be broadly divided into three categories based on their harvesting level: over harvested, under harvested and not harvested. Prominent examples of over-harvested medicinal plant species are *Alstonia scholaris* (Chhatiwan), *Asparagus racemosus*, *Rauvolfia serpentina*, *Curculigo orchoides* (Kalo Musli), *Ephemerantha macraei* (Jiwanti), *Piper longum*, *Tinospora cordifolia* (Gurjo), etc. In many cases, the extent of exploitation is so severe that many species have become rare in many localities. Despite fair availability, some under harvested medicinal plants of Terai's forests are *Phyllanthus emblica*, *Terminalia bellirica* (Barro), *T. chebula* (Harro), *Aegle marmelos*, *Cassia fistula* (Rajbriksha), *Holarrhena pubescens* (Indra Jau), etc. Another category of medicinal plants that are available in wild in considerable quantities but their commercial harvesting have so far not been notably initiated are *Butea monosperma* (Palas), *Mallotus philippensis* (Sindure), *Justicia adhatoda* (Asuro), *Tribulus terrestris* (Gokhur), *Woodfordia fruticosa* (Dhairo), etc (Sukla, 2002).

Chiraito in mid-hill especially in eastern Nepal has highly suffered from wild collection without getting maturity and huge quantity of trade, although its cultivation is also started to limited scale. Price of Chiraito was almost five times in late 1990s than at the present price (NRs. 125/kg) that encouraged high exploitation of the species in the mid-hill. Chiraito have very few other rivals in the mid-hill as regards its price. Other species are moderately affected due to commercial collection from wild. Currently, few species such as Tejpat, Sugandh Kokila, Rudraksha, Timur, Ritha, Alaichi, etc has been brought under cultivation. Species such as Allo, Lokta, Argeli, etc are being managed by some CFUGs through *in situ* conservation activities.

Benefit from Jatamansi collection and trading in a small village of Jumla District

Chaudabisa Valley in Jumla district has a population of about 15,000 people, spread across 4 VDCs and 17 villages. The average household size is about 8 persons per household. Despite the fact that only about 10 per cent of land is arable, the main occupation of most households is agriculture. The main crops grown are maize, buckwheat, wheat, and potatoes. With low crop yields and cropping intensity, only about 60 per cent of the households have sufficient food, and therefore migration is a common practice. About 80 per cent of the households in Chaudabisa involve themselves in the collection of Spikenard. Harvesting conflicts are known to occur. Official permits are required from the Department of Forests for collection of the resource for which the royalty that has to be paid in proportion to the amount that is collected. The Spikenard collected is generally airlifted from the STOL airfield at the district headquarters.

On an average, the amount of Spikenard collected per household was about 100 kg, given that in Chaudabisa a total of 69,500 kg was collected. The employment generated by this trade (collection and pottering) was 20,600 days per year. In 1992/93, the average earning was about US\$ 20 per household. Since raw Spikenard can not be exported, a processing plant is located on the Nepal-India border at Krishnanagar. The price of Spikenard in Nepal (US\$ 1.70/kg) is lower than the price across the border in India (US\$ 2.24/kg), which gives rise to illegal trade. The oil that is extracted from Spikenard sells for US\$ 180/kg. In short, the Chaudabisa households gain the least from the product they harvest.

Source: Karnali Institute, 1994.

In Nepal, some FUGs are already collecting and managing NTFPs. Few examples include resin tapping around Dhankuta, production of Jatamansi in Humla, cultivation of Chiraito and Argeli in Ramechhap and some eastern districts and management of Lokta in Dolkha, Parbat and Baglung and Syangja. However, still huge efforts are necessary to achieve active participation of communities in the management and utilization of so far underutilized or neglected many non-wood forest products.

Traditional harvesting system generally implies cutting or uprooting of herbs. This practice is believed to be serious as annual harvests in a given area are declining and people have found it more difficult to collect the products. Additionally, the growing period in highland areas (where the herbs and medicinal plants are found) is short, generally from June to August, after which, due to a rapid decline in the temperature, the plants go into hibernation. This is the time when herbs and medicinal plants are collected and the time when livestock are grazed in large numbers on highland pastures called patan. Unmanaged grazing and trampling effects of livestock, early harvesting of the resources, and often over-harvesting are the main threats to sustained supply of NTFPs. In simple terms, there is no supply management, and harvesting is not carried out in a scientific way; these are both major threats to the continued existence of herbs and medicinal plants.

The existing methods of harvesting are extensively unscientific leading to total devastation of NTFPs and deterioration of the habitat in many cases. Pre-harvest operation, harvesting and strategic planning for complexity of harvesting (e.g. multiple harvest and simultaneous harvest of multiple products) and post harvest treatments are the vital activities for NTFP management and utilization for perpetuity. The improvement in tools and techniques and dissemination of sparsely available best indigenous practices on NTFP management to wider communities (i.e. actual resource managers) is also necessary for sustainability and livelihood support of poor.

The following have been perceived problems on NTFPs harvesting/ production:

- Improper harvesting of whole natural/wild stock of plants, including roots and seeds, before they have chance to produce next generation
- Harvesting of natural/wild species before they produce flowers and/ or fruits, also reducing the chances of a next generation
- Improper post-harvest treatment of collected MAPs or plant parts (cleaning, drying, grading, storage, etc) and adulteration of collected items
- Haphazard and heavy collection (i.e. beyond the limit of sustainable harvest) from marginal or ecologically sensitive areas
- Lack of rotational collection practice and maximum collection from nearby open access areas
- Inconsistent supply of quality raw materials and scattered resource availability.

An important factor that influences the quality of the raw NTFPs, especially MAPs, is the time at which it is harvested. The leaves are usually gathered throughout the growing period. They are picked either singly or the entire stem is cut off and the leaves are separated afterwards. The leaf should be healthy, free from diseases, insects and pests and clean and dry. The aerial or top parts of the plant are collected with the flower-bearing stem just before or at the beginning of the flowering stage. Fruits and seeds are collected when they are mature.

The following have been considered as the technically accepted methods among NTFP experts for the product harvesting:

- Root and stem of the plants are generally collected from September to March. Some precautions are necessary during the root/ rhizome collection with a view to achieve sufficient regeneration of the plant. For this purpose some part of root, stem or tuber

should be left in the ground. Generally rotation of 4 years is appropriate for such products. eg: Kutki, Sarpagandha, Jatamansi, Pakhanved, etc

- Bark should be collected during winter season or before March. It is not good to collect bark at the time of leaf sprout. In the case of bark, harvesting should be made from lesser than one third part of harvestable bole which is generally considered above 1 m above ground surface below 15 cm diameter. Rotation for bark harvesting should at least be of 4 years. eg. Dalchini, Kaphal, Kaulo, Chhatiwan etc.
- Leaves are generally collected before the flowering period, each year. In case of shrubby plants leaf can be collected by cutting branches; eg: Taxus, Digitalis, Belladonna, Tejpat etc.
- Fully bloomed flowers are collected during dry season. eg: Simal, Dhayero, Chamomile, Pyrethrum,
- Fruits should be collected after maturity, generally at the time of ripening. eg: Amala, Harro, Barro, Badhar, Pipla etc
- Seeds are collected after full maturity of fruit or before breaking down of fruits. eg: Sarpagandha, Neem, Timur etc.

Proper time of collection is very important to ensure renewal of the resource. Malla *et al* (1995) points out that suitable collection period in case of whole plant harvesting is when fully matured; for bark and leaf at the onset of blossoming; and for flowers and seeds at the time of flowering and maturity. Rotational collection practice with period lapse ranging from one years to more (lesser for leaf, fruit, flower yielding species and higher for root, tuber, rhizome, bark yielding species) is also necessary to ensure regeneration. Malla *et al* (1995) quoting the economic mapping survey (supported by FRIS project) also recommends that amount of product harvesting in case of roots, rhizomes, bulbs and whole plants should be 30 % of available stock; for stems, twigs and leaves, 50- 60% and for flowers and seeds up to 90 %. However, NTFP experts vary in their view about proportion of stock to be kept intact to ensure regeneration; e.g. Rawal (2058) recommends harvesting of 75 % of total NTFP stock (in wholesome for all species) while Parajuli (2001) suggests for up to 90 % but keeping sufficient rotation period (in an average of 4 years for root, tuber, rhizome, bark yielding species) for regeneration purpose.

Most of the herbs or NTFPs collected are from government-owned pastures, shrub lands and forests, and thus access to collectors is not restricted and is subjected to royalty. Such lands are generally in remote and inaccessible areas where government monitoring (and enforcement) of annual harvests is not carried out. Several reasons that suggests poor enforcement and hence over exploitation of the resources may be as follows:

- The stipulated royalty rates do not have any bearing on the abundance of the products.
- The stipulated rates do not reflect the market value of the product.
- The royalty rates vary for the same products because of the difference in the names used in different areas.
- Royalty rates are not enforced on individual collectors at the collection point, but at the wholesale point in the districts. As a result there is little prospect of relating the volumes collected to sustainable harvesting rates.
- Products collected from government-managed and other forests cannot be distinguished. In practice, all herbs and medicinal plants can be taxed regardless of ownership. The taxing of private property is a common source of conflict between collectors and forestry officials. Currently, the royalty system provides no preferential incentive for cultivation on private land, or for common property management.

- The growing success in community forestry has yet to be applied to management of herbs and medicinal plants.

Export quantities of NTFPs including MAPs and the revenue accruing to the government are remarkable. Edward (1995) recorded 10-15 thousand metric tons (MT) of NTFPs from 150 species (or varieties) being annually traded from Nepal. Validating the data, DFO records of the three years fiscal years (FY) from BS 2058/59 to 2060/61 show the average quantity at around 11.3 thousand MT despite the disappointing management and trade transaction due to deterioration political environment of the country. The quantity of NTFPs issued by DFOs/DoFs for collection and transit permits issued in the FY 2060/61 alone was 10.4 thousand MT that have generated more than NRs 66 million in the national treasury as revealed by the Table 2. The Table 2 also illustrates the principal NTFPs in the decreasing order of quantities of transaction. However, much confusion exists regarding national export and revenue. Difficulties arise primarily due to improper recording of collection permits issued for species of NTFPs and interpretation of existing data is also made difficult in cases where all NTFPs are placed under one heading. Illegal trade of NTFPs is also extensive as export of some of the species exceeds amounts for which DFOs issue permits. In an old scenario, Larsen (2000) reported that national processing capabilities of Jatamansi (a species for which unprocessed export is banned) amounted to about 80 MT to 120 MT by HPPCL and 30-45 MT by other rural distilleries operating in Nepal while collection in one valley of Jumla District alone was 70 MT. Kanel (2000) says 10 % of the total royalty from the forestry sector is that of NTFP sub-sector. Data of DoF of 2002 shows that 3200 MT of NTFPs were exported from Nepal contributing NRs. 14.9 million as revenue in the fiscal year 2001/2002 (Sharma *et al.* 2004). Rawal (1995) reported 90 % of the export volume of NTFPs are traded in raw form and in an average 100 types of NTFPs are yearly traded.

Table 2: Permits issued for collection and transit by DFOs with quantities of three fiscal years (2058/59-2060/61) and revenue generated in the fiscal year 2060/61

S. N.	Name of the Species	Quantity (kg) issued by DFOs/ DoF for collection and transit			Average Quantity (kg)	Revenue in FY 060/61 (NRs)
		FY 2058 /59	FY 2059/60	FY 2060/61		
1	Khoto (Pinus resin)	6071421	1775085	3836183	3894229.79	11508549.00
2	Babio	2739200	2740707	-	1826635.67	-
3	Khayar	22906.29	1198262.77	658408.4	626525.82	6584083.9
4	Ritha	541335	616333	420435.5	526034.50	907718.8
5	Timur	503689.5	650193.8	365475	506452.77	1162575
6	Pawan ko bokra	136000	740707	219370	365359.00	1184710
7	Lauth salla	507222	285414	78472	290369.33	1961800
8	Amala	41337.5	528832.5	48805	206325.00	94383
9	Bhorlapat	372000	167817		179939.00	
10	Jhyau/ Budhani	173554	206185	134570	171436.33	1313120
11	Chiraito	188415	119315.5	169703	159144.50	481627.6
12	Lokta/ Argeli/Allo	147167	166324	144861	152784.00	
13	Pakhanved	33549	328825.5	74503	145625.83	367344
14	Jatamansi	127853	46734	208464	127683.67	3058045.5
15	Kurilo/Satawari	65487	104213.5	107681	92460.50	241357
16	Sikakai/Rasulla	82205	79118	41044	67455.67	45120.1
17	Bhorla bokra	58970	28200	99100	62090.00	96265
18	Tejpat/ Masalapat	42663	97532.86	33560	57918.62	337155.5
19	Amalved/Padamchal	63574	94261	39998.5	65944.50	109321
20	Sugandhawal	15903	42497	88589	48996.33	1300696
21	Majitho	52272	48303.5	27190.5	42588.67	23510
22	Dalchini/Tej bokra	14546	91703	18279	41509.33	360484
23	Sugandha kokila	76868	37690	1900	38819.33	
24	Rudraksh	3235	332	92699	32088.67	278097
25	Chutro/ Daruhaldi	4819	48233.5	42960	32004.17	171332.5
26	Pipala	3142	6461	79255	29619.33	396276
27	Tigedi	7421	68625	12500	29515.33	25000
28	Somlata	6726	23133	46516	25458.33	92490
29	Jibanti	6995	24938.5	32556.5	21496.67	102614.5
30	Tendupat	31500	3760	20875	18711.67	39150

NTFPs Marketing

Trade in herbs is not new practice for Nepal. It was described in Sanskrit legends 3,000 years ago, was encouraged by unified Nepal's first ruler in the 18th century, and has been described by European travelers from that time onwards (Edwards, 1996). The international demands for natural products, and hence medicinal plants, are increasing at an alarming rate due to the tendency or fashion of modern people for their use in personal health care, cosmetics, etc. Ten to fifteen thousand tons of crude medicinal herbs of more than 100 species are collected annually from forests and pastures, many of which are exported to India. This trade is an important source of livelihood and cash income (estimated to be in the order of 10 million US Dollars in Nepal) for rural communities.

More than 100 types of NTFPs including high value and low volume 2 fungi (viz. Yarsagumba and Guchhi chyau) and a type of organic exudates (called Silajeet) are currently exported from Nepal mainly to India (also see Table 2). Kanel (1999) estimated that every year about 20,000 MT of MAPs worthing US\$ 18-20 million are traded and about 90 % of

this collection is exported mainly to India in the raw form. In 1997/98 almost 93 per cent of all volume of MAPs traded from Nepal went to India with a total value ranging between US\$ 12.8-18million (Nagpal and Karki, 2004). All these figures indicate the substantial quantities of NTFPs under trade with India. A study conducted by CERPA (2004) indicates that there is continuous demand of high value Nepalese MAPs in the Indian sub-continent (Table 3) and is likely to be continued.

Table 3: Estimated demand (MT) of key medicinal plants in 2004/05 in Indian sub-continent

S.N.	Local name	Scientific name	Demand (MT)
1.	Atis	<i>Aconitum heterophyllum</i>	410
2.	Chiraita	<i>Swertia chirayita</i>	1285
3.	Daruhaldi/ Chutro	<i>Berberis aristata</i>	1830
4.	Jatamansi	<i>Nardostachys grandiflora</i>	866
5.	Kakarsinghi	<i>Pistacia chinensis</i>	120
6.	Kutki	<i>Picrorhiza kurrooa</i>	317
7.	Sarpagandha	<i>Rauvolfia serpentina</i>	588
8.	Somlata	<i>Ephedra gerardiana</i>	920
9.	Sugandhawal	<i>Valeriana jatamansi</i>	216
10.	Tej patta	<i>Cinnamomum tamala</i>	888
11.	Timur	<i>Zanthoxylum armatum</i>	23

Source: Demand & Supply assessment by Centre for Research Planning and Action (CERPA), New Delhi, 2004.

Above table indicates that almost 7,463 MT of MAPs are demanded in the Indian-subcontinent only from 11 species out of the average annual demand of about 20,000 MT from many species under trade. Chiraita, Daruhaldi, Jatamansi, Somlata and Tej patta seem to have highest share. Similar studies (ANSAB, 2004; Tiwari *et al*, 2004) on trade of NTFPs at specific markets have shown huge export to India mostly in raw form (see Table 4). Some of the species under trade with India also have handsome industrial demand in the Kathmandu valley. However, the demand in Kathmandu valley is not competing with Indian trade. Demand from Indian Trade Centre seems focusing more towards medicinal plants whereas the demand in Kathmandu valley is diverse and focusing more towards aromatic plants/products.

Table 4: Annual export of NTFPs from Nepal to India

Species	Buying rate (IRs/kg)	Total annual trade (MT)	Av. annual quantity (MT)
Amala (<i>Phyllanthus emblica</i>)	30	75	52
Atis (<i>Aconitum heterophyllum</i>)	850	5	4
Bojho (<i>Acorus calamus</i>)	20	20	14
Chiraito (<i>Swertia chirayita</i>)	100-120	30	25
Dalchini (<i>Cinnamomum tamala</i>) : bark	30-35	50	35
Jatamansi (<i>Nardostachys grandiflora</i>)	100	80	75
Jhyau (<i>Lichen</i> sps)	50	115	80
Majitho (<i>Rubia majith</i>)	28-30	80	56
Padamchal (<i>Rheum australe</i>)	30-35	8	6
Pakhanved (<i>Bergenia ciliata</i>)	13-15	120	84
Pipla (<i>Piper longum</i>)	100	6	4
Ritha (<i>Sapindus mukorossi</i>)	10	195	140
Sarpagandha (<i>Rauvolfia serpentina</i>)	190-210	15	10
Satawar (<i>Asparagus racemosus</i>)	100-125	80	56
Sugandhawal (<i>Valeriana jatamansi</i>)	60-65	80	75
Tejpat (<i>Cinnamomum tamala</i>) : leaf	20	500	250
Timur (<i>Zanthoxylum armatum</i>)	55-60	10	8

Source: Indian Trade Centre, Tanakpur, India, 2003 (Final Technical Report, ANSAB, 2004)

From among the species commonly traded from Nepal, NMPB-India has emphasized promotion of the species such as Atis, Chiraito, Jatamansi, Kesar, Kutki, Lauth salla, Sarpagandha, Somlata, Sugandhawal, Talispatra, Tejpat, Timur, etc on the basis of market potential for sustainable development in the Himalayan region.

International markets for NTFPs are unreliable with high quality requirements; while the NTFP business in Nepal has market mostly in India, which are speculative, controlled by cartels formed by traders and middlemen and prices change over a short period of time. The medicinal plant based companies are used to getting their raw material at very low prices. The collectors are not organized and have virtually no bargaining power; hence, their profit margins are less than 10 % of the final price obtained in India. Collective marketing and forest management as well as the availability of market information would reduce premature collection as encroachment on highly marginal forests in high altitudes.

Fluctuating demand and price, poor infrastructure for transportation (for bulky products), loss and decay due to primitive post harvesting practices, exhausting resource base, multiple levying by different level of authorities, lack of quality and quantity in demand by markets, hype of forest products certification schemes, etc. have been observed as the major hindrances to healthy marketing of NTFPs. The mistrust and non-transparent nature of the pricing process, market and price control by few buyers, artificially created fluctuation in demand from the buyers or processors, and the lack of knowledge by the collectors are the main drawbacks in the marketing of NTFPs.

The current market price information provided by few organizations like ANSAB, FNCCI, BDS MaPs, etc is significantly facilitating marketing of NTFPs, which is also serving as tool to fetch good price to producers and collectors. However, such information is still insufficient, limited to only fewer products and the dissemination, too, being limited to small number of users, especially beneficiaries as organizations. Such practice was formerly brought in vogue by EFEA project of HMGN in collaboration with BSP-New Era. Since last few years, ANSAB is implementing a project on Market Information System, which is providing price information of around 30 species on monthly basis based on price information from few market centers of Nepal and India.

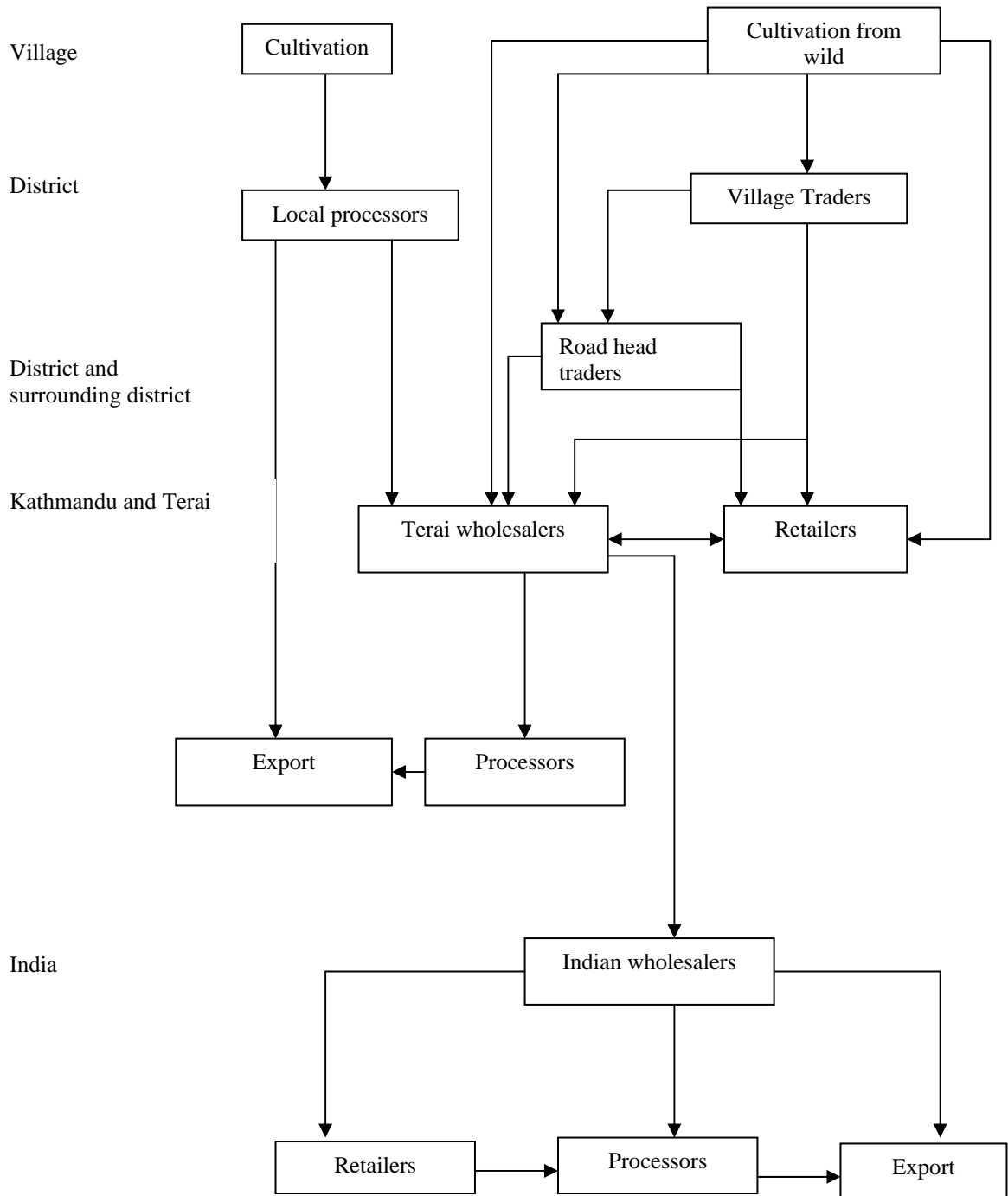
The average market price of principal NTFPs at the major trade centers of Nepal and India are given in the Annex 1. Various studies have revealed that collectors often do not recover adequate price to cover his/her time. This is exacerbated when collectors sell their MAPs on an individual basis to traders, as they lack bargaining power and frequently deal with intermediary traders who provide a lower price than road-head traders. To some extent this is a reflection of market efficiency- the price will stay low until collectors are no longer willing to collect MAPs at that price. This would require an alternative livelihood strategy with greater return than MAPs collection.

Transportation has been one of the major hindrances in trade of underutilized MAPs of high land. NTFPs of high land are generally air lifted to major trade centers of Terai or are transported by porter or by mules and sheep to convenient motorable points and thereafter brought to Terai markets on motors. The bulky materials like Jatamansi, Jhyau, Lauthsalla, Padamchal, and Chiraito are generally brought down to southern low land markets on mules followed by motors.

More than 20 varieties of essential oils are processed in Nepal considering both the domestic and international markets. But, very often both the quantity and quality are inappropriate for international community. Essential oils and extracts of medicinal and aromatic plants produced by HPPCL are mostly exported to Europe and the Asia Pacific regions. Few other private distillation companies also supply essential oils in European markets. Rosin and Turpentine from HPPCL are supplied to the domestic and Indian markets while Herbal Care Products are mostly consumed in the domestic markets.

The flow of herbs from the place of origin to the destination involves a number of intermediaries in the marketing chain (Figure 1). The herbs and medicinal plants gathered are carried to collection points, which may be at the district head quarter or at the road head. In Nepal, market and trade channel of NTFPs follow the general pattern of move from forest to hamlet to road head/ local markets to larger regional trade centers to India or other countries (Rawal, 2004); the scheme is presented diagrammatically in the figure 1 below. This channel requires transit permits that often involve illegal financial transactions.

Figure 1: Market Chain of MAPs



Source: Olsen, 1997

Three main groups are distinguishable in herb marketing; namely the collector, the trader (middlemen) and to a lesser extent, the officials. The collectors could be either hired or the permit holders. The hired collectors are paid for their collection, usually at the collection site or at the road head. Then after their toles will be completely disappear in the marketing system. Permit holders are local collectors who have permits and are better informed about plants and details about their location. Because of the information at their disposal, their bargaining power is relatively better than the hired collectors and hence they benefit more.

Organized marketing system with facilities for wholesale markets are greatly felt by producers, collectors, traders and entrepreneurs of NTFPs in the prevailing context of poorly developed marketing mechanism. Although combined with multiple constraints, there are ample opportunities from market development to ultimately benefit the producer/ gatherers and many enterprises involved in the trade and processing of NTFPs in Nepal. Cooperative approach of NTFP promotion as practiced in some parts of the county has shown promising results. To evolve effective sustainable management system, villagers residing near resource area need to be involved in management and development by forming their Cooperative. The cooperative formed by some community based forest user groups have enabled them to manage forest resources sustainably, thereby serving benefits on equitable basis and improving the income level. Such societies may need back support to establish a price coherent to nearby trade centers and also require collaboration for improved productions and other transactions (collection and sale) through the cooperative. Such practice is most likely to improve the bargaining power of the communities and they will get fair price for the products throughout the year even in the price downs period. Extension program through such societies is most likely to improve knowledge base, skill and marketing wisdom of communities. Such community cooperatives are noticed to be functioning in some districts of Nepal including Dolakha, Kavre, Doti, and Saptari.

The following have been perceived problems in NTFPs marketing:

- Partial information or inadequate knowledge to collectors/ producers on types and quantity of products required by market and/ or their prices favoring the buyer/customer
- Poor access to desired markets due to production and processing constraints;
- Lack of up to date market information and inability to visit clients (traders/buyers) or interact closely with them due to financial constraints and lack of a established systems
- Inadequate funding mechanism at local level to support small scale NTFP enterprise
- Irrational royalty rate for some of the NTFPs
- Multiple levying for the products
- Lack of an organized marketing and need for wholesale markets

Few species of NTFPs are still having higher royalty rates compared to the market price. Hence, royalty rates as percentage of market price has been one of the evaluation criteria for prioritization. The scoring ranks based on such criteria are given in the Annex 4, Table 4.6.

Conservation and Legal Protection

Medicinal plants of commercial values are in a state of threat due to deforestation and over harvesting. Heavy and haphazard collection of NTFPs including MAPs, loss of habitat, increasing urbanization and shrinking forest base have resulted in significant decline in the volume of raw materials produced. This has caused irreversible loss to the population of many species. For this reason conservation, management and sustainable utilization of medicinal plants is necessary for Nepal. Threat assessment, ex-situ conservation practices and regularized systems for conservation and management are major activities for sustainable utilization of MAP resources. HMGN has endorsed Herbs and NTFP Development Policy

(2004) in recent years to develop this sector. In many parts of Nepal, MAPs in the wild are depleting due to continuous harvests without any plan to regenerate and sustain them. These plants occur even now in good density in national parks and reserves, where harvest is prohibited or restricted. Lack of proper management has rendered plants of high commercial value in state of threat; this is prevalent throughout the country. So far, fifty one medicinal plants have entered into different categories (see Annex 3) such as rare, endangered, vulnerable and commercially threatened (Bhattarai et al, 2002; Sharma *et al* 2004). Over harvesting of resource in many cases has made them rare in the wild, in some cases threatening or even endangering their status. To minimize such threat, the government has taken different measures such as ban on the collection of resources or restricting their export in the raw form. Currently, 60 species of non-endemic plants of Nepal are considered as threatened (Shrestha and Joshi, 1996; Sharma et al, 2004); among them 29 are MAPs. For this reason, conservation and sustainable utilization of medicinal plants have been identified as the key issues for Nepal. In recent times, HMGN has given a high priority to develop this sub-sector for the benefit of rural people in general. The Forest Rules (1995) states that species not mentioned in the legislation can not be traded. Furthermore, government may impose ban on collection, use, sale, distribution, and export of any products/ species suspected threatened without any justification. Realizing the threats from commercial collections of plant resources, the government has put ban on collection and/or export of the species as listed in the Table 5 below.

Table 5: Plants under HMGN protection list

Plants banned for collection, use, sale, distribution, transportation and export				
S.N.	Scientific name	Nepali Name	English	Use
1.	<i>Dactylorhiza hatagirea</i>	Panchaunle	Orchid	Medicinal & tonic
2.	<i>Juglans regia</i>	Okhar bokra	Walnut	Dye
3.	<i>Neopicrorhiza scrophulariiflora</i>	Kutki	Gentian	Medicine
Plants banned for export outside the country in unprocessed form				
4.	<i>Nardostachys grandiflora</i>	Jatamansi	Spikenard	Medicine & incense
5.	<i>Rauwolfia serpentina</i>	Sarpagandha	Serpentine	Medicine
6.	<i>Cinnamomum glaucescens</i>	Sugandhakokila	Nepali Sassafras	Aromatic
7.	<i>Valeriana jatamansi</i>	Sugandhwal	Valerian	Medicine & incense
8.	<i>Parmelia spp.</i>	Jhyau	Lichen	Medicine
9.	<i>Abies spectabilis</i>	Talis patra	Fir	Incense
10.	<i>Taxus baccata</i>	Lauth salla	Himalayan yew	Medicine
11.	Rock exudates	Silajeet	Rock exudates	Medicine
Plants banned for Transportation, export and felling for commercial purpose				
12.	<i>Michelia champaca</i>	Chanp	Magnolia	Timber
13.	<i>Acacia catechu</i>	Khayar	Cutch Tree	Medicine
14.	<i>Shorea robusta</i>	Sal	Common Sal	Timber
15.	<i>Bombax ceiba</i>	Simal	Silk cotton tree	Timber
16.	<i>Dalbergia latifolia</i>	Satisal	Rose wood	Timber
17.	<i>Pterocarpus marsupium</i>	Bijaya Sal	Indian Keno Tree	Timber
18.	<i>Juglans regia</i>	Okhar	Walnut	Timber

Source: Nepal Rajpatra, 31 December, 2001; 26 September, 2005 (Forest regulation, third amendment).

NTFPs whose roots are collected and traded in huge volume are generally considered threatened and are more vulnerable than those species used in small quantities and whose aerial parts only are used. The 13 species (Table 5) are considered to be threatened, due to commercial collection of root, tuber, rhizome or whole plant, most are found in habitats of relatively high altitude, and efforts on conservation have consequently centered on high-altitude habitats, leading to ban on collection of high altitude plants such as Panchaule, Kutki and Okhar, and unprocessed export of among others, Jatamansi and Sugandhawal.

It is apparent to any conservationist that species having wide distribution are less threatened as compared to those having localized distribution. Thus, the habitual species of restricted area are required to have intensive care or management. Hence the range of distribution evidently evolves out to be one criterion for conservation or protection of the commercial species. So, the ranking of the species is made by scoring as shown in the Annex 1.

Nepal being one of the signatory of the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) also have moral obligation to protect the species as listed under such convention. Altogether 14 Nepalese indigenous MAPs are listed under CITES (see Table 6) and the regulatory mechanism to control the trade of these species are developed by DoF (the management authority) under recommendation of DPR (the scientific authority).

Table 6: Nepal's flora under CITES appendices

S.N.	Nepali Name	Scientific Name	English Name	Appendix
1	Bantarul, Bhyakur	<i>Dioscorea deltoidea</i>	Dioscorea	II
2.	Bhotelahara*	<i>Gnetum montanum</i>	Gnetum	III
3.	Chanp, Bhalu kaath*	<i>Talauma hodgsonii</i>	Magnolia	III
4	Lauth salla	<i>Taxus baccata</i>	Himalayan Yew	II
5.	Gunsi*	<i>Podocarpus neriifolius</i>	Podocarpus	III
6.	Jharikote*	<i>Tetracentron sinense</i>	Tetracentron	III
7.	Kalbal, Jokar, Jaggar	<i>Cycas pectinata</i>	Cycas	II
8.	Kutki	<i>Picrorhiza kurroa</i>	Kutki	II
9.	Kyashar*	<i>Meconopsis regia</i>	Himalayan Yellow Poppy	III
10.	Laghupatra	<i>Podophyllum hexandrum</i>	May Apple	II
11.	Mirkelahara	<i>Ceropegia pubescens</i>	Milkweed	II
12.	Sarpagandha	<i>Rauwolfia serpentina</i>	Serpentine	II
13.	Sungavaharu	<i>Orchidaceace spp.</i>	Many species of orchids	II
14.	Unyu, Rukh Unyu	<i>Cyathea spinosa</i>	Tree Ferns	II

*Species mentioned under Appendix III by Nepal

Source: Chapagain and Dhakal (2003)

In-country Processing and Use

Nepal has remained a mere supplier of raw NTFPs in absence of local processing centers. Even though some traditional processing/value addition practice prevail in some locations for few species, they are poorly recognized because of quality and/or quantity reason, lack in product diversification and inadequate knowledge on marketing of the products. Need for different types of NTFP processing and value adding units combined with market information has been acutely realized in the country. Scientific methods of collection, post harvest care and primary processing are also necessary for the grass root resource users to reduce the undergoing losses and obtain higher income. Shifting the traditional extraction and trading system to sustainable enterprises equipped with technical, marketing and training support is felt need of collectors to traders. Cooperative approach appears to be a powerful tool, being able to attract financial support from outside to develop a business plan including marketing studies. Information gathered in market studies helps develop new post-harvest processing and value-added systems for strategic products.

Many companies/ entrepreneurs in Nepal are involved in commercial processing or value addition of NTFP (some on small scale for local markets while other on larger scales for national or international markets). Tiwari, N.N. *et al* (2004) has attempted a study on annual consumption of herbs in Kathmandu Valley, which shows processing of 1031481 kg of raw NTFPs from 186 species and 38975 kg essential oil from 19 species. The same study has listed 15 major Ayurvedic companies, practitioners and trading houses of the valley involved in processing of 214 NTFPs (either species or forms) for formulation of different Ayurvedic preparations and essential oils. Among the 214 sps, 128 NTFPs species are fulfilled from Nepal, 75 NTFPs/MAPs species are imported especially from India and 11 NTFPs/MAPs species are usually taken both either from Nepal or India. The major processing companies of Kathmandu along with the approximate number of species utilized by them are given in the Table 8. Moreover, a large number of industries are spread over different parts of the country outside the valley; some leading ones are Humla Oil P. Ltd., Mallika Handmade Paper, Himali Jadibuti Udhdyog (Sindhupalchowk), Laxmi Rosin and Turpentine (R&T), Khanal R&T, Ganapati R&T, Sunrise R&T, Natural Flower and Herbal, etc; however, their exact number and quantity of consumption is unclear. Further large numbers of species are processed locally in traditional medical system. Currently, numerous development organizations are also involved in local income generation activities through promotion of NTFP based processing/ value addition units/ enterprises. Few familiar organizations being: ANSAB, BDS MaPs, LI-BIRD, Practical Action (formerly ITDG), SNV, FECOFUN, and others.

Table 7 : List of Kathmandu based major processing centers with number of species used

S.N.	Name of processing centers	No. of species used
1.	Alternative Herbal Products Pvt. Ltd.	6
2.	Singh Durbar Baidhyakhana Bikas Samiti	164
3.	Dabur Nepal Pvt. Ltd.	12
4.	Gorkha Ayurved Company	86
5.	Natural Resources Industry	18
6.	Male International Pvt. Ltd.	20
7.	Everest Herbs Processing Pvt. Ltd.	21
8.	Cosmos Herbal products Pvt. Ltd.	10
9.	Traditional Himalayan Herbs	189
10.	Suri Herbal Products Industry	134
11.	Krishna Aushadhalaya	121
12.	Piyusbarshi Aushadhalaya	72
13.	Siddhartha Herbal Industry	7
14.	Kunfen/ other Tibetan Aushdhalaya	30
15.	Aarogya Bhawan Works	137

Following have been the perceived problems in NTFPs processing/ value addition

- Difficulties in processing in remote areas and limited means of transportation for NTFPs to the nearer processing sites
- Lack of appropriate processing technologies to promote local processing in the hilly and mountainous regions
- Lack of consistency, quality and information

Matrix Analysis

Nepal is ordained with a large number of commercially and ethno-botanically important NTFPs; more than 100 species are currently exploited for commercial uses and above 1600 are having ethno-botanical use. The lists are still mounting up because of expanding investigation and documentation. The lists of such useful species are too large to be of practical use in concentrating the limited development resources of the country for their commercial and sustainable promotion. Hence, to utilize effectively the available national capital, selections of smaller number of species (10 to 20) are required for an intensive research and development focus.

The broad criteria for prioritization of viable species are mainly related with ecology (resource), market, technology, and legal provisions. Resource management environments; social, institutional or legal perspectives, access to technology or innovations and market are analyzed in detail while attempting any prioritization work. The study team felt some abstraction while recommending few top species from the priority lists of HNCC and NMPB since some of the criterion set by both the institutions seems too general and needs further elaboration to satisfy the entrepreneur for their investments. Hence, the research team has carefully and specifically reviewed these criteria and put forth very practical and experience based sets of criteria, some of which may have stem from one general criterion. Considering the 8 criteria of HNCC and the 5 criteria of NMPB; altogether 17 practically applicable criteria (both qualitative and quantitative in nature) have been used in this study for scoring and ranking. The scoring is made to the species under each criterion through detail scientific judgements, analysis and review as in the Table 8 below:

Table 8: Scoring to the selected species by each of the 17 different criterion

Species	Market value/ price	Annual Export Quantity (DFO record)	AV. Ann. Export to ITC, Tanakpur	Annual Industrial Demand in Kathmandu	Ease of cultivation/ propagation	Royalty rate as % of market price	Parts of use in trade	Bulkiness	Range of distribution (horizontal & vertical)	Threat category/ Conservation status	Legal protection	Availability of local processing techniques	Regeneration/ rotation period	Ethno-botanic importance	Potentiality of further processing	Social acceptance for promotion	Quality improvement potential	Total Score
Atis	5	1	1	1	2	1	1	3	2	3	4	2	3	4	2	3	2	40
Bisjara	5	1	1	1	1	5	1	3	5	3	4	2	1	3	2	2	2	42
Bojho	2	1	1	1	4	5	1	3	2	5	4	3	5	3	5	3	2	50
Bel	1	1	1	3	3	5	5	3	3	5	4	3	5	5	3	4	5	59
Kurilo	5	5	2	1	4	5	1	3	4	2	4	4	3	3	3	4	2	55
Neem	3	1	1	1	5	5	4	2	1	5	5	3	5	3	4	3	5	56
Pakhanbed	1	5	2	1	2	5	1	3	2	4	5	2	3	3	3	2	2	46
Cammomile	5	1	1	2	5	5	5	3	2	5	5	4	5	2	4	5	4	63
Sugandkokila	4	2	1	1	3	5	5	4	2	4	3	3	5	2	5	4	4	57
Tejpat	1	5	5	3	5	5	4	1	3	5	5	5	4	5	4	4	3	67
Yarsagumba	5	1	1	1	1	3	1	5	3	3	4	2	2	2	3	1	1	39
Lemongrass	1	1	1	5	5	5	4	1	2	5	5	4	5	2	4	5	3	58
Panchaunle	5	1	1	1	2	4	1	5	4	1	1	2	1	3	3	2	1	38
Bhyakur	2	1	1	1	4	4	2	4	5	2	2	3	3	3	3	3	2	45
Dhasingre	1	1	1	1	1	5	4	1	3	4	5	4	4	2	4	2	3	46
Okhar	5	1	1	1	4	1	2	3	2	1	1	5	2	3	1	3	5	41
Mentha	1	1	1	5	5	5	4	2	2	5	5	4	5	4	3	5	3	60
Guchichyau	5	1	1	1	1	5	1	2	2	3	4	5	2	5	2	1	1	42
Jatamansi	5	5	2	1	2	4	1	2	4	2	3	4	3	4	5	2	1	50
Kutki	5	1	1	1	1	5	1	2	3	2	1	2	3	5	4	2	1	40
Jhyau	2	5	2	1	1	2	1	1	4	3	3	1	1	1	4	1	3	36
Amala	2	5	2	5	4	5	5	4	3	5	5	5	5	5	5	4	4	73
Pipla	4	2	1	5	4	4	4	5	2	3	5	3	5	4	4	3	5	63
Laghupatra	3	1	1	1	2	5	1	2	4	2	2	1	2	1	1	1	2	32
Sarpagandha	5	1	1	4	3	2	1	3	2	1	2	2	5	3	4	5	2	46
Padamchal	4	4	1	1	2	5	2	3	3	2	4	4	3	4	3	4	2	51
Majitho	3	3	2	1	3	5	3	2	2	2	5	1	5	1	2	2	3	45
Ritha	1	5	3	1	3	4	5	4	1	5	5	2	5	2	5	4	4	59
Chiraito	5	5	1	3	3	4	1	2	3	2	5	2	5	5	5	5	4	60
Sayapatri	2	1	1	1	5	5	1	2	3	5	5	1	5	1	3	3	4	48
Lauth Salla	5	5	1	5	3	5	4	1	3	1	2	4	3	1	4	3	4	54
Gurjo	1	1	1	2	4	5	3	2	1	2	4	3	3	4	5	3	1	45
Sugandhawal	4	3	2	1	4	4	1	3	5	2	3	4	5	4	5	2	2	54
Timur	5	5	1	1	3	5	5	5	3	5	5	5	2	5	4	4	5	68

The study has found Amala, Chamomile, Pipala and Mentha to be the priority species for Terai and Siwalik regions; Timur, Tejpat, Chiraito and Ritha for Mid-hills; Sugandhawal, Padamchal, Jatamansi, and Bisjara for High-mountain for commercial promotion by involving private investors (see Table 9 below).

Table 9: Final list of prioritized species with scoring and ranking by ecological zones

S.N.	Total	Species	Prioritized sps by climatic zones
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	Score		Terai	Mid-hill	Himal
1.	73	<i>Phyllanthus emblica</i> (Amala)	Amala	Timur	Sugandhawal
2.	68	<i>Zanthoxylum armatum</i> (Timur)	Chamomile	Tejpat	Padamchal
3.	67	<i>Cinnamomum tamala</i> (Tejpat)	Pipala	Chiraito	Jatamansi
4.	63	<i>Chamomila matricaria</i>	Mentha	Ritha	Bisjara
5.	63	<i>Piper longum</i> (Pipla)	Bel	Lauthsalla	Guchhichyau
6.	60	<i>Mentha arvensis</i> (Mentha)	Lemongrass	Pakhanbed	Atis
7.	60	<i>Swertia chirayita</i> (Chiraito)	S.kokila	Dhasingare	Kutki
8.	59	<i>Aegle marmelos</i> (Bel)	Neem	Bhyakur	Yarsagumba
9.	59	<i>Sapindus mukorossi</i> (Ritha)	Kurilo	Majitho	Panchaule
10.	58	<i>Cymbopogon flexuosus</i> (Lemongrass)	Bojho	Okhar	Laghupatra
11.	57	<i>Cinnamomum glaucescens</i> (S.Kokila)	Sayapatri	Jhyau	
12.	56	<i>Azadirachta indica</i> (Neem)	Sarpagandha		
13.	55	<i>Asparagus racemosus</i> (Kurilo)	Gurjo		
14.	54	<i>Taxus baccata</i> (Lauth Salla)			
15.	54	<i>Valeriana jatamansi</i> (Sugandhawal)			
16.	51	<i>Rheum australe</i> (Padamchal)			
17.	50	<i>Acorus calamus</i> (Bojho)			
18.	50	<i>Nardostachys grandiflora</i> (Jatamansi)			
19.	48	<i>Tagetes minuta</i> (Sayapatri)			
20.	46	<i>Bergenia ciliata</i> (Pakhanbed)			
21.	46	<i>Gaultheria fragrantissima</i> (Dhasingre)			
22.	46	<i>Rauvolfia serpentina</i> (Sarpagandha)			
23.	45	<i>Dioscorea deltoidea</i> (Bhyakur)			
24.	45	<i>Rubia majith</i> (Majitho)			
25.	45	<i>Tinospora sinensis</i> (Gurjo)			
26.	42	<i>Aconitum spicatum</i> (Bisjara)			
27.	42	<i>Morchella conica</i> (Gucchi chyau)			
28.	41	<i>Juglans regia</i> (Okhar)			
29.	40	<i>Aconitum heterophyllum</i> (Atis)			
30.	40	<i>Neopicrorhiza scrophulariiflora</i> (Kutki)			
31.	39	<i>Cordyceps sinensis</i> (Yarsagumba)			
32.	38	<i>Dactylorhiza hatagirea</i> (Panchaunle)			
33.	36	<i>Parmellia</i> species (Jhyau)			
34.	32	<i>Podophyllum hexandrum</i> (Laghupatra)			

Conclusions

NTFP sub-sector, especially MAPs, in Nepal has great potential for improving the socio-economic status of local people as well as increasing national income and employment opportunities. The expanding global market of herbal products because of people's inherent interest and continuing belief on its efficacy has certainly attracted Nepalese investors too. Despite the huge potential of NTFP resources in Nepal for commercial promotion only few have been brought into vogue. The large volume of the resources so far mostly exported in raw form, is likely to increase the national income by many folds when processed in the country. This activity in addition to generating local employment also has potential to attain resource sustainability as the establishment of processing centers requires IEE/EIA study based on resource availability as per the Environment Protection Rules 1997. With the establishment of local processing centers, the collectors have good chance to entertain buy back guarantee and farmers also get attracted towards NTFPs domestication and commercial farming in private lands. Organized marketing channels such as cooperatives or wholesale markets are nowadays a better mean to increase bargaining power of collectors, farmers as well as traders.

Based on newly developed criteria Amala, Chamomile, Pipala and Mentha in Terai and Siwaliks; Timur, Tejpat, Chiraito and Ritha in Mid-hill and Sugandhawal, Padamchal, Jatamansi and Bisjara in High-mountain are identified as very remunerative plant species for commercial promotion by inviting private sector investors.

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Annex 1: Scoring/ ranking of the 34 species under 17 different criteria

(a. Ranking by average market price/ value)

S.N.	Name of the species	Market price (NRs/kg)	Score
1.	<i>Cordyceps sinensis</i> (Yarsagumba)	180000	5
2.	<i>Dactylorhiza hatagirea</i> (Panchaunle)	50000	5
3.	<i>Morchella conica</i> (Gucchi chyau)	5000	5
4.	<i>Aconitum heterophyllum</i> (Atis)	475	5
5.	<i>Taxus baccata</i> (Lauth Salla)	350	5
6.	<i>Matricaria chamomilla</i> (Cammomile)	275	5
7.	<i>Juglans regia</i> (Okhar)	175	5
8.	<i>Asparagus racemosus</i> (Kurilo)	170	5
9.	<i>Rauvolfia serpentina</i> (Sarpagandha)	140	5
10.	<i>Zanthoxylum armatum</i> (Timur)	135	5
11.	<i>Swertia chirayita</i> (Chiraito)	125	5
12.	<i>Neopicrorhiza scrophulariiflora</i> (Kutki)	120	5
13.	<i>Nardostachys grandiflora</i> (Jatamansi)	115	5
14.	<i>Aconitum spicatum</i> (Bisjara)	110	5
15.	<i>Valeriana jatamansi</i> (Sugandhawal)	90	4
16.	<i>Piper longum</i> (Pipla)	80	4
17.	<i>Cinnamomum glaucescens</i> (Sugandha Kokila)	80	4
18.	<i>Rheum australe</i> (Padamchal)	75	4
19.	<i>Podophyllum hexandrum</i> (Laghupatra)	60	3
20.	<i>Rubia majith</i> (Majitho)	60	3
21.	<i>Azadirachta indica</i> (Neem)	50	3
22.	<i>Parmellia</i> sps (Jhyau)	45	2
23.	<i>Tagetes minuta</i> (Sayapatri)	45	2
24.	<i>Dioscorea deltoidea</i> (Bhyakur)	40	2
25.	<i>Acorus calamus</i> (Bojho)	35	2
26.	<i>Phyllanthus emblica</i> (Amala)	35	2
27.	<i>Cinnamomum tamala</i> (Tejpat)	24	1
28.	<i>Tinospora sinensis</i> (Gurjo)	22	1
29.	<i>Bergenia ciliata</i> (Pakhanbed)	20	1
30.	<i>Aegle marmelos</i> (Bel)	20	1
31.	<i>Sapindus mukorossi</i> (Ritha)	18	1
32.	<i>Mentha arvensis</i> (Mentha)	7	1
33.	<i>Gaultheria fragrantissima</i> (Dhasingre)	7	1
34.	<i>Cymbopogon flexuosus</i> (Lemongrass)	3	1

Scoring reference/ ranking process: Species/products maintaing average price greater than NRs. 100 per kg is assigned with the highest score of 5 while those possessing prices in the ranges from NRs. 75 to 100, 50 to 75, 25 to 50 and less than 25 are given the scores of 4, 3, 2 and 1 respectively.

b. Ranking by average annual collection/ export quantity (average from the Fiscal Year 2058/59 to 060/61) as shown by the Annual Reports of DoF

S.N.	Name of the species	Export Quantity (in kg)	Score
1.	<i>Sapindus mukorossi</i> (Ritha)	526034.50	5
2.	<i>Zanthoxylum armatum</i> (Timur)	506452.77	5
3.	<i>Taxus baccata</i> (Lauth Salla)	290369.33	5
4.	<i>Phyllanthus emblica</i> (Amala)	206325.00	5
5.	<i>Parmellia</i> sps (Jhyau)	171436.33	5
6.	<i>Swertia chirayita</i> (Chiraito)	159144.50	5
7.	<i>Bergenia ciliata</i> (Pakhanbed)	145625.83	5
8.	<i>Nardostachys grandiflora</i> (Jatamansi)	127683.67	5
9.	<i>Cinnamomum tamala</i> (Tejpat)	99427.95	5
10.	<i>Asparagus racemosus</i> (Kurilo)	92460.50	5
11.	<i>Rheum australe</i> (Padamchal)	65944.50	4
12.	<i>Valeriana jatamansi</i> (Sugandhawal)	48996.33	3
13.	<i>Rubia majith</i> (Majitho)	42588.67	3
14.	<i>Cinnamomum glaucescens</i> (Sugandha Kokila)	38819.33	2
15.	<i>Piper longum</i> (Pipla)	29619.33	2
16.	<i>Aconitum spicatum</i> (Bisjara)	14315.67	1
17.	<i>Acorus calamus</i> (Bojho)	7437.33	1
18.	<i>Tinospora sinensis</i> (Gurjo)	6439.83	1
19.	<i>Aconitum heterophyllum</i> (Atis)	3694.50	1
20.	<i>Morchella conica</i> (Gucchi chyau)	2430.93	1
21.	<i>Neopicrorhiza scrophulariiflora</i> (Kutki)	1888.33	1
22.	<i>Dioscorea deltoidea</i> (Bhyakur)	1707.33	1
23.	<i>Juglans regia</i> (Okhar)	1566.67	1
24.	<i>Gaultheria fragrantissima</i> (Dhasingre)	369.33	1
25.	<i>Cymbopogon flexuosus</i> (Lemongrass)	55.00	1
26.	<i>Cordyceps sinensis</i> (Yarsagumba)	27.90	1
27.	<i>Azadirachta indica</i> (Neem)	22.67	1
28.	<i>Rauvolfia serpentina</i> (Sarpagandha)	17.50	1
29.	<i>Dactylorhiza hatagirea</i> (Panchaunle)	0	1
30.	<i>Podophyllum hexandrum</i> (Laghupatra)	0	1
31.	<i>Tagetes minuta</i> (Sayapatri)	0	1
32.	<i>Aegle marmelos</i> (Bel)	0	1
33.	<i>Matricaria chamomilla</i> (Cammomile)	0	1
34.	<i>Mentha arvensis</i> (Mentha)	0	1

Scoring reference/ ranking process: The species or products issued for collection/ export permits by DFOs in total annual average quantity of more than 80,000 kg from/within the country are attributed to the highest score of 5. Those NTFPs demanded for collection or export from DFOs (by paying required royalty to the government) in quantities from 60,000-80,000, 40,000-60,000, 20,000-40,000 and less than 20000 kg are ascribed with the scores of 4, 3, 2, and 1 respectively.

Annex 2: Cultivation economics of some relevant species

1. Cost benefit analysis of Lemongrass (4 Year Crop) on per hectare basis

S.N	Description	Quantity	No. of labor	Per unit cost (Rs)	Total Rs.
Year 1					
1	Land preparation		25	60	1500
2	Seedlings	225000		0.10	25000
3	Nursery management				0
4	Compost	10 tons		300	3000
5	Seedling transplanting		32	60	1920
6	Weeding hoeing		18	60	1080
7	Irrigation				0
8	Harvesting		25	60	1500
9	Processing				3750
Total: 15250					
Expenditure during year 2,3 & 4					
1	Compost	5 tons		300	1500
2	Weeding		25	60	1500
3	Irrigation				1500
4	Harvesting		35	60	2100
5	Processing				7500
Total 14100					
6	Total expenditure in year 2,3 and 4				42300
7	Total production cost for four years (42300 + 15250)				57550
8	Total oil production in four years 315 kg				
9	Total return from sales of oil (315 kg @ NRs. 400/kg)				126000
10	Gross profit in four year				68450
11	Average profit per year				17112.5

(Source: Bhattari 2001, HPPCL 2002, Parajuli 2001(b)). ITTO project document prepared by MFSC for the promotion of NTFPs in Terai region of Nepal (2004)

2. Cost benefit analysis of *Mentha arvensis* (seasonal crop) on per hectare basis

S.N	Description	Quantity	No. of labor	Per unit cost (Rs)	Total Rs.
First cutting					
1	Land preparation		35	60	2100
2	Seedlings/suckers	350 kg		2	700
3	Compost	10 tons		300	3000
4	Sucker planting		30	60	1800
5	Weeding hoeing and fertilizer application		50	60	3000
6	Irrigation				2000
7	Pesticides				200
8	Harvesting		25	60	1500
9	Processing				3800
Total 18100					
Expenditure for second cutting					
1	Compost	5 tons		300	1500

2	Weeding		20	60	1200
3	Irrigation				1500
4	Harvesting		10	60	600
5	Processing				200
					Total 5300
6	Total expenditure in two cuttings (18100 + 5300)				5300
7	Total oil production in two cuttings 100 kg				
8	Total return from sales of oil (100 kg @ NRs. 500/kg)				50000
9	Net profit (50000-23400)				26600

(Source: Bhattari 2001, HPPCL 2002, Parajuli 2001(b)). ITTO project document prepared by MFSC for the promotion of NTFPs in Terai region of Nepal (2004)

Annex 3:

List of Threatened medicinal and Aromatic Plants in Nepal

S.N.	Plant Species	Nepali Name	Threat Category	
			CAMP	IUCN
1.	<i>Michelia Champaca</i> L.	Champ	CR	EN
2.	<i>Pterocarpus marsupium</i> Roxb.	Bijayasal	CR	-
3.	<i>Rouvolfia serpentina</i> (L.) Benth. Ex Kurz	Sarpagandha	CR	EN
4.	<i>Aconitum balangrense</i> Lauener	Bikh	EN	-
5.	<i>Alstonia neriifolia</i> D. Don	----	EN	R
6.	<i>Corydalis megacalyx</i> Ludlow	----	EN	-
7.	<i>Crateva unilocularis</i> Buch. Ham.	Siplikaan	EN	R
8.	<i>Dactylorhiza hatagirea</i> (D. Don) Soo	Panchaunle	EN	-
9.	<i>Dioscorea deltoidea</i> Wall.	Bhyakur	EN	T
10.	<i>Ephedra intermedia</i> Schrenk & C. A. Mey	Somlata	EN	-
11.	<i>Gloriosa superba</i> L.	Kewari	EN	R
12.	<i>Heracleum lalii</i> C. Norman	----	EN	-
13.	<i>Operculina turpethum</i> (L.) S. Manso	Nisothe	EN	-
14.	<i>Oroxylum indicum</i> (L.) Kurz	Tatelo	EN	V
15.	<i>Otochilus porrectus</i> Lindl.	----	EN	-
16.	<i>Pistacea chinensis</i> subsp. <i>nitegemima</i> . (J.L. Stewart)	Kaakarsingi	-	R
17.	<i>Swertia angustifolia</i> Buch.-Ham. Ex D. Don	Bhale chiraito	EN	-
18.	<i>Taxus wallichiana</i> Zucc.	Lauth salla	EN	-
19.	<i>Acacia catechu</i> (L.f.) Willd.	Khayar	-	T
20.	<i>Aconitum gammiei</i> Stapf	Bikh	-	R
21.	<i>Aconitum heterophyllum</i> Wall.	Atis	V	R
22.	<i>Aconitum laciniatum</i> (Bruhl) Stapf	Bikh	-	T
23.	<i>Aconitum spicatum</i> (Bruhl) Stapf	Bikh	V	T
24.	<i>Allium hypsistum</i> Stearnb.	Jimbu	V	-
25.	<i>Allium przewalskianum</i> Regel	Jimbu	-	V
26.	<i>Alstonia scholaris</i> (L.) R. Br.	Chhatiwan	V	R
27.	<i>Arnebia benthami</i> (Wall ex G. Don) John	Mahaarangi	V	-
28.	<i>Asparagus racemosus</i> Willd.	Sataawari	V	-
29.	<i>Bergenia ciliata</i> (Haw.) Stearnb.	Paakhanbed	-	T
30.	<i>Butea monosperma</i> (Lam.) Kuntze	Palas	V	EN
31.	<i>Curculigo orchioidea</i> Gaertn	Kalo musali	V	-
32.	<i>Dalbergia latifolia</i> Roxb.	Satisaal	-	V
33.	<i>Delphinium himalayai</i> Munz	Atis	V	-
34.	<i>Elaeocarpus sphaericus</i> (Gaertn.) Sch.	Rudrakshya	-	V

35.	<i>Ephemerantha macraei</i> (Lindl) Hunt. Sum.	Jiwanti	V	-
36.	<i>Fritillaria cirrhosa</i> D. Don	Kaakoli	V	-
37.	<i>Nardostachys grandiflora</i> DC.	Jataamansi	V	V
38.	<i>Neopicrorhiza scrophulariifolia</i> (Pennel) Hong	Kutaki	V	V
39.	<i>Paeonia emodi</i> Wall.	Chandra	-	R
40.	<i>Panax pseudo-ginseng</i> Wall.	Mangan	V	-
41.	<i>Paris polyphyla</i> Sm.	Satuwaa	V	V
42.	<i>Piper longum</i> Linn.	Pipalaa	V	-
43.	<i>Podophylum hexandrum</i> Royle	Laghupatra	V	V
44.	<i>Rheum australe</i> D. Don	Padamchaal	V	-
45.	<i>Rheum nobile</i> Hook. f. Thoms.	Amalbetas	V	R
46.	<i>Rubia manjith</i> Roxb.	Majitho	V	-
47.	<i>Swertia chirayita</i> (Roxb. Ex Flem.) Karstn.	Chiraaaito	V	V
48.	<i>Tinospora sinensis</i> (Lour.) Merr.	Gurjo	V	-
49.	<i>Valeriana jatamansi</i> Jones	Sugandhawaal	V	-
50.	<i>Jurinea dolomiaea</i> Boiss	Dhupjadi	NT	-
51.	<i>Meconopsis dhwojii</i> G. Taylor ex Hay	----	NT	-
52.	<i>Rheum moorcroftianum</i> Royle	Padamchaal	NT	-
53.	<i>Arisaema costatum</i> (Wall.) Mart. Ex Schott	Sarpko makai	LC	-
54.	<i>Aconitum bisma</i> (Buch.-Ham.) ex Rap.	Bikh	DD	-
55.	<i>Aconitum ferox</i> Wall. Seringe	Seto bikh	DD	-
56.	<i>Lilium nepalense</i> D. Don	Khiraule	DD	-
57.	<i>Maharanga bicolor</i> (Wall. Ex G. Don) A. DC.	Mahaarangi	DD	K
58.	<i>Maharanga emodi</i> (Wall.) A. DC	Mahaarangi	DD	K
59.	<i>Pongamia pinnata</i> (L.) Pierre	Karengi	DD	-
60.	<i>Swertia multicaulis</i> D. Don	Sarmaaguru	DD	-

Note: CR= Critically Endangered, DD= Data deficient, EN= Endangered, K= Insufficiently known, NT= Nearly threatened, And V= Vulnerable

Source: Shrestha and Joshi (1996); Bhattarai et al. (2001)