Ministry of Forests and Soil Conservation
Kathmandu, Nepal

CURRENT STATUS OF CULTIVATION AND MANAGEMENT OF NON-TIMBER FOREST PRODUCTS IN THE TERAI REGION OF NEPAL

January 2004

ITTO Project No. PPD 6/99 Rev. 3 (M.F.1)
Preparation of Project Proposal for the Promotion of Non-Timber Forest Products in the Terai Region of Nepal

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Project Background

The rich biodiversity of Nepal accommodates a wide range of Non-Timber Forest Products (NTFPs), including Medicinal and Aromatic Plants (MAPs). Rural people have long been involved in the conservation, collection and sale of NTFPs. This has contributed significantly to the rural livelihood. Many of the NTFPs are being exported every year to India and overseas and the revenues are increasing every year. The annual royalty collected by District forest offices ranged from NRs. 16.6 to 21.5 million (US$215,584-279,220) during 1999/2000 and 2001/2002 (DOF, 2002). Commercial extraction for NTFPs and other useful plants is increasing every year but they are being extracted against the principles of sustainable management, which as an effect has caused the depletion of the country's wild resources. Some species are already at the verge of extinction.

Realizing this situation, Ministry of Forests and Soil Conservation (MFSC), His Majesty's Government of Nepal (HMG/N) requested the International Tropical timber Organization (ITTO) to provide funds to undertake a thorough study on the status of NTFPs, its cultivation and marketing practices and prepare a detailed proposal for implementation to promote NTFPs in the Terai region of Nepal. Consequently, the International Tropical Timber Council (ITTC) approved a project entitled "Preparation of a Project Proposal for the Promotion of Non-Timber Forest Products in the Tropical Region of Nepal" to be financed through ITTO. The MFSC entrusted the study upon Centre for Economic Development and Administration (CEDA), a research institute of Tribhuvan University in 2002. CEDA undertook this study by forming a multidisciplinary team of experts from relevant fields. A Project Steering Committee (PSC) was constituted by MFSC that supported, facilitated and coordinated the overall study. With the help and support of all concerned, the team accomplished the study and prepared five documents, three thematic reports, one consolidated report and a project proposal as mentioned below:

i) **Current Status of Marketing of Non-Timber Forest Products in the Terai Region of Nepal.**
ii) **Current Status on Cultivation and Management of Non-Timber Forest Products in the Terai Region of Nepal.**
iii) **Quantitative Resource Assessment of Non-Timber Forest Products in the Terai Region of Nepal.**
iv) **A Synthesis Report on Current Status of NTFPs in the Terai Region of Nepal and**
v) **A Project Proposal on Sustainable Management and Cultivation of Non-Timber Forest Products in the Terai Region of Nepal.**

Above three (i-iii) thematic reports provide background information to formulate a project proposal and provide further reference to future policy dialogues, reforms and program formulation. The project proposal has been prepared to be submited to International Tropical Timber Organization (ITTO) in order to request funds to implement various activities related to the promotion of NTFPs in the Terai region of Nepal.

Acronyms

ANSAB	: Asia Network for Sustainable Agriculture and Bio-resources
BISEP-ST	: Biodversity Sector Programme for Siwaliks and Terai
BSP	: Biodiversity Support Programme
CARE	: Cooperative American Relief Everywhere
CFUG	: Community Forest User Group
CEDA	: Center for Economic Development and Administration
CECI	: Canadian Center for International Studies and Cooperation
CBED	: Community Based Economic Development
CF	: Community Forestry
DDC	: District Development Committee
DEPROSC	: Development Project Services Centre
DFO	: District Forest Officer/District Forest Office
DFRS	: Department of Forest Research and Survey
DNPWC	: Department of National Parks and Wildlife Conservation
DOF	: Department of Forests
DOR	: Department of Roads
DPR	: Department of Plant Resources
DSCWM	: Department of Soil Conservation and Watershed Management
EFEA	: Environment and Forestry Enterprise Activity
FECOFUN	: Federation of Community Forest Users' Group of Nepal
FGD	: Focus Group Discussion
FUG	: Forest User Group
GTZ	: German Technical Assistance
HAN	: Hotel Association of Nepal
HPPCL	: Herbs Production and Processing Company Limited
HMG/N	: His Majesty's Government of Nepal
ICIMOD	: International Centre for Integrated Mountain Development
ITTC	: International Tropical Timber Council
ITTO	: International Tropical Timber Organization
IOF	: Institute of Forestry
INBAR	: International Network for Bamboo and Rattan
LFP	: Livelihoods Forestry Programme
MAPs	: Medicinal and Aromatic Plants
MFSC	: Ministry of Forests and Soil Conservation
NARC	: Nepal Agricultural Researc Council
NGO	: Non Governmental Organisation
INGO	: International Non Governmental Organisation
NTFPs	: Non Timber Forest Products
PRA	: Participatory Rural Appraisal
PSC	: Project Steering Committee
RONAST	: Royal Nepal Academy for Science and Technology
RRA	: Rapid Rural Appraisal
SAFE-Concern	: Socioeconomic, Agroforestry and Environment Concern
SBBS	: Singhdurbar Baidyakhana Bikas Samiti (Sighdurbar Ayurvedc Medicine Development Board)
SDC	: Swiss Development Cooperation
VDC	: Village Development Committee

Acknowledgement

Non-Timber Forest Products (NTFPs) are one of the important sources of government revenue and their contribution to the rural livelihoods is quite significant. A large number of people in the rural areas have been engaged in off- farm employment opportunities and generating income through the collection and sale of NTFPs. I would like to express my gratitude to the Ministry of Forests and Soil Conservation for providing us the opportunity to carry out the task of research and study in such an important topic. In this connection, I would like to thank the Secretary of MFSC, Mr. Chandi Prasad Shrestha and Chief of Foreign Aid Coordination Division, Dr. Damodar Prasad Parajuli for their cooperation.

This report is the outcome of the hard work of many experts who were involved in field survey, data analysis and writing the reports. Altogether three thematic reports, a status report and the end document-a Project Proposal for future implementation have been prepared.

Dr. Nirmal Kumar Bhattarai prepared the report on the Quantitative Resource Assessment of Non Timber Forest Products in the terai Region of Nepal. Dr. Vrigu Rishi Duwadi produced the preliminary draft on Current Status of Cultivation and Management of Non Timber Forest Products in the Terai Region of Nepal. The invaluable inputs of Dr. Annapurna Nanda Das and Dr. Krishna Chandra Paudyal were instrumental in finalising the report. Likwise Mr. Ram Hari Subedi did the preliminary draft on Current Status of Marketing of Non Timber Forest Products in the Terai Region of Nepal and final draft and final reports were prepared with the combined efforts of Mr. Sagendra Tiwari, Mr. Kishore K.C. and Mr. Vijay Kunwar. The Synthesis Report on Current Status of Non Timber Forest Products in the Terai Region of Nepal was solely the contribution of Dr. Bharat Kumar Pokharel. Mr. Man Mohan Dhoj Joshi prepared the preliminary draft of the Project Proposal and the joint efforts of PSC members, Mr. Kishore KC and Mr. Vijay Kunwar did the finalization of the proposal. I would like to extend my sincere thanks to all of them.

All the core members of the study team and other foresters and botanists, who worked as associates namely, Messrs Kuber Junj Malla, Suman Sigdel, Omkar Joshi, Ripu Kunwar, Mohan Kafle and Ram Kumar Deo undertook the field survey. Messrs Kishore K.C, Suman Sigdel and Omkar Joshi did the arduous job of data analysis. Mr. Ripu Kunwar worked out for systematizing and analyzing the information collected from quadrat sampling carried out in Sunsari, Bara and Banke districts. He also visited numerous institutions concerned with NTFPs to collect valuable information, which were used in the three thematic reports. Dr. Bhuvan Bajra Bajracharya did the final editing and Dr. Pushpa Shrestha did some literature review. Thanks are due to all of them. Ms. Subarna Shrestha did the formatting of the reports at various stages. Last but not the least, team leader, Mr. Kishore K.C. deserves special thanks for his untiring efforts and coordinator, Mr. Vijay Kunwar for the backstopping support during the entire study period.

The Project Steering Committee (PSC) of the MFSC provided technical inputs to the study through various meetings and was quite instrumental in improving the quality of the reports. In this connection, I would like to thank Dr. Damodar Prasad Parajuli, Chairman of the PSC, Mr. Harihar Sigdel and Mr. Lokendra Purush Dhakal, Member Secretaries (in two different time phases), Dr. Annapurna Nanda Das, Mr. Gopal Kumar Shrestha, Mr. Rajendra Kafle, Mr. Din Dayal Bhattarai, Mr. Prem Karki, Mr. Purushottam Joshi and Mr. Ananda Bhandari for their hard work and constructive comments.

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Chapter 1

Introduction

1.1 Project background

Non-timber forest products (NTFPs), also sometimes referred to as non-wood forest product (NWFPs) or minor forest products (MFPs) include all goods, other than timber or wood, that are produced in forests, pastures and meadows. Prominent examples of NTFPs are: medicinal and aromatic plants and herbs, roots, barks, leaves, fruits and nuts, grasses, bamboo and canes, resins and saps, lac and tasar silk, honey, etc., in their raw form (Bhattarai and Croucher 1996).

People living in rural areas of Nepal have very few employment and income opportunities. The NTFPs is a major source of income to the rural people, many of whom are socially and economically disadvantaged. They help sustain livelihoods to the many rural households and communities in Nepal. The promotion of NTFP through increased cultivation and sustainable management can help increase revenue for the government. The labour intensive nature of collection and harvesting, transportation and sale of such products have multiplier effects, both on the rural and urban economies of Nepal.

The research studies and development programmes on NTFPs in the past have been mainly focused on the Midhills and High Mountain Regions of Nepal. Even though the Terai region of Nepal is very rich in NTFP resources, very few studies and development programmes were initiated on the NTFPs in the Terai, the tropical/subtropical regions of Nepal. The Terai forests are considered very productive and rich in biodiversity. The revenue generated through sale of timber and fuelwood is one of the important sources for the HMG/N. In comparison to the revenue from the sale of timber and fuelwood of the Terai, the revenue from the sale of NTFPs produced in the Terai region is very negligible. Nonetheless, they provide substatial benefits to the many rural communities of the Terai, and particularly those living in the vicinity of national forests. Until recent past, the Terai forestry sector was mainly focused at producing timber and fuelwood. At present very little information is known about the staus of NTFPs in the Terai Forests.

Realising this situation, Ministry of Forests and Soil Conservation of His Majesty's Government of Nepal (HMG/N) requested the International Tropical Timber Organization (ITTO) to provide fund for the NTFPS promotion in the tropical region. Consequently, the International Tropical Timber Council (ITTC) approved a project entitled "Preparation of a Project Proposal for the Promotion of Non-Timber Forest Products (NTFPs) in the Tropical Region of Nepal" to be financed through the International Tropical Timber Organization. The concept of pre-project was envisaged before the preparation of a detail proposal on "Sustainable Management and Utilization of NTFPs in the Terai Region of Nepal". After the approval from the ITTO, the Ministry of Forests and Soil Conservation (MFSC) entrusted the study to the

Center for Economic Development and Administration (CEDA), a research institute of Tribhuvan University in 2002. CEDA undertook this study by forming a multidisciplinary team of experts from relevant fields. The Project Steering Committee (PSC) constituted by MFSC supported, facilitated and coordinated the overall study.

The present study aims at formulating a detailed long-term project proposal for the promotion of conservation, management, sustainable utilisation and enterprise development of non-timber forest products applicable to the tropical (and sub-tropical) region of Nepal.

1.2 Rationale of the study

NTFPs of the Terai region are increasingly identified as the valuable resources and its importance to the local communities and its economic potential is increasingly realized. Its potential towards reducing poverty and sustaining rural livelihoods as envisaged in the present Tenth Five Year Plan can only be possible, if they are conserved and managed on sustainable basis. However, very little is known about their conservation status and indigenous management practices. The documentation on the Terai NTFPs is also very poor. The scientific knowledge and information on suitable cultivation techniques and management is lacking. The situation calls for documenting the information through collecting primary and secondary sources on the present status of NTFPs cultivation and management practices in the Terai region of Nepal. The high value NTFP species need to be identified and their in-*situ* and ex-*situ* conservation and their potential for domestication and commercialisation need to be explored. The species that needs ex-*situ* and in-*situ* conservation need to be identified before launching any programme aimed at promoting the development of NTFP resources in the Terai region of Nepal.

1.3 Objectives of the study

The main goal of this pre-project study is to provide a basis for the preparation of a detailed project proposal for the promotion of Non-Timber Forest Products in the Terai Region of Nepal in line with the ITTO guidelines. Among the four key outputs envisaged by the pre-project, this document deals with the status of NTFPs cultivation and managemnt in the Terai regions of Nepal. The main objectives of this NTFP cultivation and management study is to:

1. Review the present cultivation status of NTFPs in the Terai and Inner Terai region.
2. Review the existing in-*situ* and ex-*situ* conservation and management practices of NTFPs in the Terai region.
3. Assess the potential benefits of NTFP cultivation through gross margin analysis.
4. Make necessary recommendations on the intervention required for the promotion of NTFPs cultivation, conservation and management in the Terai region.

The present study is built upon the primary and secondary sources of information collected from the various stakeholders located within the Terai region of Nepal, concerned departments within the Ministry of Forests and Soil Conservation, Ministry itself and NTFPs traders based in India. The current study is expected to provide a sound background information to formulate a detailed project plan for the sustainable development, conservation and management of NTFPsin the Terai (tropical) region of Nepal.

1.4 Study area

The study is mainly focused in the Terai region of Nepal, which in general have tropical climate. The Terai region is a relatively flat area lying between the Siwalik Hills and the southern frontier of Nepal. Its altitude ranges from 70 to 300m above sea level. The Terai can be divided into three sub-zones: the Bhabar Terai, Terai and Southern Terai. The Bhabar Terai zone lies immediately at the foothills of Siwalik Hills, and contains bouldery and gravelly alluvial soils. The Terai refers to the area where the water, which has drained into the gravels of the Bhabar Terai, reappears again at the surface. With the eradication of malaria and the initiation of government for resettlement programmes, this zone has become populated and also has good agricultural land. The Southern Terai is an extension of the Gangetic Plain of India (Jackson, 1994). Except in the Bhabar Terai, the soils in the Terai region are alluvial and fine to medium-textured and have good water holding capacity. The Terai region is of paramount importance, as this region is being developed agriculturally and industrially (HMG/N, 1988a). There is common anecdote that Terai region is the grain basket of Nepal.

The Siwaliks or Churia Hills have been formed from sediments produced by the rising Himalayas during the last 40 million years or so. The Siwalik Hills extends from Terai in the south to the Mahabharat Range in the north. The altitude ranges from 500 to 1800m above sea level (Jackson, 1994). The sediments are soft and very erodible; as a result there are many gullies and badly eroded land in Churia hills. Due to this reason and lack of water they have not been cultivated in the past and there was very little inhabitation in the past. However in recent years, areas of cultivation have begun to rise, which is very undesirable considering its fragile nature.

Siwalik hills enclose several cultivated valleys, locally known as the Inner Terai or Duns, and some intricately dissected outwash plains (HMG/ADB/FINNIDA, 1988). The inner Terai are generally the valleys of large rivers, such as the Karnali, the Bheri, The Babai, The Western Rapti, the Chitwan Rapti and Koshi river system in the east. The inner-Terai (duns) was previously largely inhabited, due to malaria. However, it was inhabited by an indigenous people, the *Tharus,* who had developed a considerable natural resistance to the disease. After malaria eradication, large numbers of new resettlements were made in the Inner Terai region by clearing the forests.

The Terai and Siwaliks have a monsoon or sub-tropical climate with hot, wet summer and mild, dry winters. The mean annual rainfall is generally between 1500-2000 mm. The mean monthly temperature in the Terai region ranges from 35^0C to 40^0C during April-May and to 14^0C to 16^0C during January. Sometimes the temperatures of 46^0C in the Terai have been recorded (Jackson, 1994).

1.5 Research methodology

The study is based on both primary and secondary sources of information. The information were particularly gathered on different aspects of NTFPs such as status of cultivation and management, market channel, trade volume, marketing practices, and their demand and supply. Followings were the sources and methods of collecting information:

Review of relevant literature

Relevant literature related with the NTFPs was collected from various resources and studied before developing research methodology and field workplan.

Pretesting

Based on the literature reviewed and the experience of the consultant, research tools, checklists and questionnaires were designed for collecting the primary and secondary information on the study topic. Several round of discussion and interaction with the members of project steering committee helped to bring the necessary refinement in questionnaires and checklists prepared for the study.

A pre-test field visit to Makawanpur, Bara and Parsa districts was organized involving the relevant experts. Based on the experience gained during pre-testing and further interaction with the experts cum steering committee members, research tools and questionnaire sets were refined to match the field conditions.

Secondary sources of information

Secondary information/data regarding the geographical, biological, socio-economical, organizational and technological aspects of NTFPs were obtained from various institutions in and outside Kathmandu. In order to arrive at a justified conclusion regarding cultivation and management various available literatures were also reviewed.

Primary sources of information

Twenty-four (24) strategic districts were identified covering all the five Development Regions that in general represent tropical (and some sub-tropical parts) areas of Nepal. To generate information/data from the field, participatory research tools such as Focus Group Discussions (FGD), including formal and informal interviews, and interactions with key informants were conducted. The sources of information collected were forest officials from District Forest Offices (DFOs), members of Community Forest User

Groups (CFUGs), Village Development Committee (VDC)/District Development Committee (DDC) members, Herbs Production and Processing Co.Ltd (HPPCL) staffs, NTFP collectors, traders and other knowledgeable persons on the subject matter. Many individuals in Nepal and India concerning NTFP business were consulted during the study (See **Annexes 1 and 2**).

In order to collect information in systematic manner, different types of open-ended and close-ended questionnaires and checklists were administered. To have a better understanding of the cultivation and management practices, group discussions were organised with private cultivators, community user groups and government farms Information obtained from various sources were verified and crosschecked (triangulation) for authenticity through interviewing key informants, focus group discussions and workshops wherever possible.

Visit to market centres in Nepal and India

To generate the required information or to cross-check the information generated, major NTFP market centres of Nepal, mostly located in the Terai region of Nepal were visited covering all the development regions. The concerned district forest offices were visited and the focused meetings were organized at 4 places representing all the development regions and NTFP stakeholders identified. The major Indian NTFP market centres, which import NTFPs from Nepal such as Kolkata, Siliguri, Kannauj, Lucknow and New Delhi were also visited to crosscheck and generate the additional information.

Quantitativer resource assessment in the national forests of the Terai

Besides administrating research tools in various selected locations, quadrates were laid out to quantify the extent of NTFP resources in the national forests. Quadrates were taken in the locations in such a way that it can cover broad spectrum of forest types in the Terai region and was identified and designed by the team including PSC members within the survey districts.

Definition of non-timber forest products (NTFPs) used for the present study

The term 'non-timber forest products (NTFPs) encompasses all biological materials other than timber, which are extracted from forests for human and animal use.

Wickens (1991) defines NTFPs 'as all biological materials (other than industrial round-wood and derived sawn timber, wood chips, wood based panels and pulp) that may be extracted from natural ecosystems, managed plantations etc., and be utilized within the household, be marketed, or have social, cultural or religious significance. Thus, NTFPs include plants used for food, forage, fuel, medicine, fibres, bio-chemicals etc. On the other hand, many others (Wickens, 1991; Ganesan 1993; Shankar *et al.,* 1998) treat fuelwood as NTFP. Chamberlian *et al.* (1998) do not include it within NTFP.

In Nepal, fuelwood and timber are not regarded as NTFPs (HMG/N, 1988). Consistent with this understanding of NTFPs, Chandrsekharan (1998) defines NTFPs as all goods and services for commercial, industrial or subsistance use derived from forest and allied land uses, other than timber, fuelwood and fodder. For the purpose of the present study, timber, fuelwood, fodder and wildlife are not included within NTFPs.

1.5 Scope and limitations of the study

The study is expected to provide the sound background for the preparation of the detailed project proposal aimed at conservation and development of the NTFPs in the Tropical regions of Nepal. The study is expected to fill the information gaps on cultivation, management and conservation of NTFP species of the tropical region. However, the study has some limitations as follows:

- Due to time limitations, it was not possible to visit all the private NTFP growers and CFUGs. The study does not cover all aspects of cultivation and management of NTFP species in the Tropical regions of Nepal.
- The conservation status of NTFPs in the national forest is mostly based on the information from district forest officials. However, some efforts were made get onsite view of conservation status of important NTFP species during the field works.
- The number of people interviewed in this study may not represent all NTFPs growers in the Terai regions of Nepal. However, valid statistical generalization based on the primary and secondary data are made.
- During the study period, there was political instability as a result it was difficult to visit some identified places to observe NTFPs cultivation and management under farmer's field conditions.
- Growers and CFUG members were reluctant to expose their real problems with buyers (HPPCL, trader) and government authorities (the district forest officials). However, the study team made every effort to get the real data and organized three regional workshops to triangulate (cross-check) the information obtained through questionnaire surveys.

Chapter 2

Review of literature on NTFPs of Nepal

This chapter provides the brief summary of the review of literature available on the different aspects of the NTFPs, including its cultivation and management. There are very few studies on the cultivation and management of NTFP species found in the tropical regions of Nepal. The literatures that have been mentioned below are linked with the cultivation and management one way or another. Some of these papers may be linked with the policy issues and about NTFPs cultivation and management in hilly regions of Nepal, but may have relevance to the development of NTFPs in the Terai region of Nepal.

1. Rawal (2002). This paper outlines the importance of NTFP and biodiversity conservation in community forests of the Midwestern Terai of Nepal. The paper presents four case studies on NTFPs conducted in the 4 community forests. The paper outlines the importance of Pipla (*Piper longum*), Bet (*Calamus tenuis*), Sabai grass (*Eulaliopsis binnata*) and leaves of Sal (*Shorea robusta*) to the CFUGs. The paper identifies economical potential of the NTFPs derived from these species and calls for the development of appropriate conservation practices and sustainable harvesting and management prescriptions for the NTFP species found in the region.

2. Shukla, (2002). This paper outlines the richness of the Terai region in medicinal and aromatic plant resources (MAPs) and their role in health care services and rural livelihoods. The paper broadly categorises commercial MAPs of the Terai region into 3 categories: over-harvested, under-harvested and not-harvested. Prominent examples of over-harvested MAPs are *Alstonia scholaris, Asparagus racemosus, Rauvolfia serpentina, Curculigo orchioides, Ephemerantha macraei, Piper longum*, and *Tinospora sinensis*. The examples of commercially under-exploited despite their fair availability in the wild are *Phyllanthus emblica, Terminalia bellirica, Terminalia chebula, Aegle marmelos* and *Cassia fistula*. The MAPs that are available in the wild in considerable quantities but their commercial harvesting have not so far been notably initiated are *Butea monosperma, Holarrhena pubescens, Mallotus philippensis, Justicia adhatoda, Tribulus terristris*, and *Woddfordia fruticosa*. The paper calls for database preparation of medicinal plants to facilitate information on their identification, uses and status in the wild, which will ultimately assist in conservation and wild medicinal plants based economic development in the Terai region.

3. Ojha (2001): The expanding market opportunities for a wide array of NTFP has not yet been the boon to poor people living close to the resource base. This is primarily due to the restrictive policy and regulations, inadequate

institutional development inputs to cope with complex social structure and limited interventions to transform the prevailing imperfect marketing structure. Above all, the local collectors tend to be paid a labour charge only and not a value of the resource in a socially just manner. The paper calls for an innovative policy and provision for external technical and business inputs.

4. Ojha *et al.* (2001): Increasing subsistence as well as commercial expectations from non-timber forest products necessitates more careful assessment of resource base and sustainable harvesting scheme. Forest User Groups as well as supporting organizations facing challenges to ensure sustainable harvesting of these products are developing specific methods to cope up with this. Finally, the paper identifies challenges and draws key lessons in developing sustainable harvesting system and practices.

5. Parajuli (2001): The general objective of this study was to develop and apply an integrated method for studying sustainable management of *Taxus baccata* in existing physical, technical and socioeconomic condition. The specific objectives were to document (i) the general distribution of *Taxus baccata* in Nepal, (ii) general trends of leafy biomass collection, (iii) to estimate the possible quantity of leafy biomass collection, (iv) to develop simple method of propagation for large scale cultivation (at different physiograpgic zones), and (v) to determine the sustainable harvesting techniques of *Taxus baccata* needles. The study recommends high priority to the domestication of this species as it assures adequate income to people provided the condition that they are appropriately marketed.

6. Shrestha (2001). The paper is based on a study conducted at Janaki CFUG of Ashigram VDC in Dadeldhura district of Far-Western region of Nepal. The CFUG manages a community forest, covering 318 hectares pure block of *Pinus roxburghii* and some mixed stands of *Rhododendron, Quercus, Myrica* and their associates. NTFPs like Sungandhawal (*Valeriana jatamansi*), Pakhanbed (*Bergenia ciliata*), Bojho (*Acorus calamus*), Timur (*Zanthoxylm armatum*) and Jhyau (*Parmelia* sp.) are available in the forest. In 1998, 2,156 kg of Jhyau, Sugandwal, Pakhanbed and Bojho were sold at twice the price they were bought from collectors. The committee earned Rs.104,182 from the trade. Encouraged with the previous deal, they invested Rs. 42,712, gaining a net profit of Rs. 61,470. The CFUG has planned to introduce more NTFPs like Sugandhawal, Bojho and other MAPs.
7. BSP/New Era. (2000). This is a useful Training Manual on Conservation, Silviculture and Utilisation of NTFPs. The manual provides the information on sustainable harvesting/collection, conservation measures, post harvesting processes, and grading for 45 important NTFPs found in the project area that included Terai and Midhills districts. It also provides summarised information on propagation and cultivation techniques for these species. The list of main Nepali and Indian traders involved in NTFPs, market rates, opportunities and challenges are outlined.

8. Chowdhary (2000). This paper gives account of rattans found in Nepal and their conservation status. *Calamus tenuis* (Pani Bet) and *C. laptospadix* (Dangre Bet) is the most commonly found species in Nepal. This paper also gives account of rattan cultivation by farmers in Nepal, but almost all of them are on small level. The paper describes traditional and improved management system of rattans practiced in Nepal. The paper describes the block management prescriptions applied in the community managed rattan forest in Sati-Karnali Community Forests in the Terai of Farwestern Nepal. The rotation for harvesting is kept 4 years in this rattan forest.

9. Hertog and Wiersum (2000): This article analyses the different management systems of timur (*Zanthoxylum armatum*) production in Nepalese forests. Products of this medicinal plant are regularly traded with India. Four different management regimes on open-access state lands, two each in community-controlled and private lands are described respectively, each being characterized by a specific set of access regimes, organizational rules for collection and management practices for this species.

10. Larsen (2000). This paper outlines what is known regarding the state of the Nepali medicinal and aromatic plant resource, and explores assumed relationships between commercial collection and the state of the resource. The paper outlines necessary steps to the sustainable management of the Nepali medicinal and aromatic plants resource, most importantly empirical data collection and collaboration with collectors so that planning can be based on actual resource abundance and uses. The paper questions western priority of conservation pf biological diversities in country like Nepal and suggests an approach where biological diversity is conserved through local use of natural resources.

11. Manandhar and Bhattarai (2000): Of the twenty-three species belonging to five genera of bamboo is recorded in Kathmandu valley, *Bambusa balcooa* is the most commonly grown species in. Except six species, all others are cultivated. *Bambusa* is the largest genus, which has ten species.

12. Ojha (2000) reviewed the current policy issues and their implications in sustainable management, utilization and trade of the NTFP resources. He found that policy issues were clustered around 'inappropriate regulatory control' and 'inadequate enabling environment' regarding sustainable NTFP management and trade. By analysing observable economic, social and ecological consequences of such issues, policy changes were recommended for sustainable use and management of the NTFP resources in Nepal.

13. Thapa *et al.* (2000): The results of growth trial of five bamboo species (*Bambusa nutans* subsp. *cupulata, Bambusa nutans* subsp. *nutans*, *Bambusa tulda, Bambusa balcooa*, and *Dendrocalamus giganteus*) at Belbari of Morang District in the eastern Terai of Nepal, indicated that the species survival were more consistent after one and half year. At 5.5 years the locally growing

species *B. nutans* subsp. *cupulata* had the highest survival (86%) followed by *B. nutans* subsp. *nutans* (76%) indicating that success could be achieved through the use of planting material from single node culm cuttings. *Bambusa nutans* subsp. *cupulata* was best in culms production and growth (diameter and height), followed by *B. nutans* subsp. *nutans*. Merchantable culms can be obtained on an annual basis for a considerable length of time only after 5.5 years of planting. *Bambusa nutans* subsp. *cupulata* is the best for planting at conditions similar to Belbari, followed *by B. nutans* subsp. *nutans* and *B. tulda.*

14. Rawal *et al.* (1999): The report is based on the findings of a workshop, participated by 60 people representing MFSC, DFOs, NTFP producers, collectors, traders and buyers. The traders and buyers were both of Nepali and Indian nationalities. NTFP based entrepreneurs identified crucial problems and issues related with cultivation and management of NTFPs. The study suggested that people should be encouraged to cultivate banned NTFPs through providing knowledge, skills, required seedlings, market assurance and market links. Permission should be given to the people to plant such crops in their private farmlands. Consignment of NTFPs should only be checked at the point of origin by the responsible authorities and then it should be sealed until it reaches the destination. The present process of checking NTFPs at several check posts are time consuming and complicates their marketing process and also harass the people involved in the trade.

15. Chandrasekharan (1998) The study is based on fieldwork, discussions with project coordinators, and literature review. The study found that NTFPs found in Nepal, present a potential means of promoting social, economic, and environmental welfare for rural communities. Their increasing commercial demand promises profitable returns from collection, cultivation and value addition, provided the condition that there is necessary institutional support available.

16. Parajuli (1998): Since long, the people of Palpa district are involved in the trade of the bark and leaves of *Cinnamomum tamala*. The way its export is increasing by many folds in the last seven years, replacement of the traditional crops by the cultivation of *Cinnamomum tamala* could be one of the viable options of maximizing the financial return. In this connection, the paper analyses the cost-benefit ratio of *Cinnamomum tamala* cultivation as against the conventional crops being cultivated on the marginal lands such as steep slopes, and on degraded soils. Calculation on the basis of a thirty years project period, cultivation of *Cinnamomum tamala* on such lands is suggested for its cost-benefit ratio of 1:16. With the additional opportunity of employment generation, majority of the Palpali people who are presently depending upon the subsistence agriculture could be attracted towards *Cinnamomum tamala* cultivation. By shifting to its cultivation, the environmental risks generated by the cultivation of cereal crops on steep slopes could also be minimized.

17. Sah and Dutta (1998): This paper reviews the status of NTFP-based income generation in local communities and discusses the role of community forestry. Income generation through community forestry has been found to have both positive and negative impacts on the local community through its influence on policy-makers and forest management practice. The importance of indigenous knowledge on sustainable NTFPs extraction and use is also described. The study concluded that community forestry products might greatly contribute to major sources of income generation for rural people locally.

18. Kleinn *et al.* (1996): The study is based on medicinal and aromatic plants of economic importance in the hill regions of Nepal. Several specific difficulties are discussed. They arise from the fact that a regular forest inventory is not specifically designed for a survey of herbaceous plants. A pilot inventory carried out in two districts in Nepal is described in the report. The paper emphasised the need of large area inventories for NTFPs that can give sound baseline information for identification of endangered species, help determine royalties and can contribute to the strategy development for managing NTFPs.

19. Amatya and Amatya (1995): This study explores possible strategies for optimum utilisation and marketing of medicinal plants so that it can contribute maximum benefits to the rural collectors. Present status of collection and trade, measures to ensure sustainable collection, and the domestic as well as foreign market trends are discussed. Policy and regulations pertaining to medicinal plant collection are discussed.

20. Malla *et al.* 1995. This report was compiled for the FSISP in 1993 and published by FRISP in 1995. This paper provides the list of major NTFPs in Nepal and identifies the issues associated with conservation, collection permits, and harvesting and sustainable utilisation and makes recommendations. The study team noticed increasing awareness among the villagers of the need for conservation of some plants of commercial value, e.g., *Cinnamopmun tamala*, *Sapindus mulorossi* and *Zanthoxylum armatum*. The paper calls for developing appropriate inventory systems, cultivation technologies, and to adopt proper record keeping, and monitoring of NTFPs collection by district forest offices.

21. Edwards, D.M., (1994): This is an outcome of a nine-week consultancy for the Nepal-UK Community Forestry Project (NUKCFP). The aims of the study were (i) to recommend how NTFPs should be incorporated into the community forestry process; and (ii) to recommend activities for the project that, if applied, would help hill communities derive greater benefits from NTFPs. Part one of the report concludes that the project should focus more on a capacity-development approach to community forestry as opposed to the current service-delivery approach. Part two is focused on background information on NTFPs. Recommendations are made which, if applied, may improve the community management of NTFPs through cultivation and/or management of

naturally occurring plants. The appendices include a selective annotated bibliography of NTFPs in Nepal.

22. Malla (1994): This is a study of usage and availability of medicinal plant resources in Bagmati zone of Central Nepal. Data on traded quantities from 1979 to 1984 and 1987 to 1990 are provided. Based on declining exports in the early 1980s, the study concludes that the resource is overexploited. Main underlying reasons outlined are urbanization, industrialization, habitat destruction, acculturation and destructive harvesting practices, especially in sub-alpine and alpine areas. The institutions involved in management and development of medicinal plants are outlined. The study suggests people-oriented policy reforms, minimisation of bureaucracy and NTFPs resource inventory. Guidelines on how to formulate rules and regulations for collection of medicinal plants are prescribed. The prospect for cultivation, is discussed, and is argued as necessary in light of overexploitation of NTFPs in wild. A plan for developing MAPs in the Bagmati zone has been drawn up; it consists of setting up an organization such as co-operative societies at zone, district and village levels, the organization will co-ordinate collection, cultivation and processing. Economic analyses are undertaken for medicinal plant cultivation and processing. The production of essential oils is concluded to be economically viable. A list of 103 medicinal plants in 4 altitudinal ranges, parts used and applications, is provided in appendix.

23. Rajbhandary and Bajracharya (1994): The study suggests that MAPs are important to the Nepali population in terms of health care and income generation, and to the global community in terms of biodiversity and prevention of environmental degradation. Increasing collection of MAPs, on the one hand has made them endangered, and on the other hand encourages their domestication and cultivation. Processing of MAPs is desirable to increase returns to collectors. A national body should be set up to formulate concrete policies to improve the opportunities for processing and marketing of MAPs in Nepal, research and development should be prioritised and regional co-operation should be established. Data on production, annual turnover, collection and revenue of Herbs Production and Processing Company Limited (HPPCL) is provided.

24. Rawal, Prasad and Adhikary (1994): The study reviews and analyses various policies of the HMG/N aimed at conservation and development of NTFPs in Nepal. HMG/N has a Master Plan to develop minor forest products by establishing herbal centres, farmers' co-operatives for cultivation and regional facilities for processing and marketing. The study identified various problems and underlying cause related to NTFPs development. It emphasised political commitment in the present democratic context and high priority to the formulation of a separate clear-cut policy for NTFPs.

25. Stapleton (1994). This book gives description on bamboos of Nepal, which also includes bamboos found in the tropical regions of Nepal. The distribution, taxonomic identification and uses are described. The book also gives account of bamboo propagation techniques. The 11 genera of bamboos found naturally or cultivated in Nepal are *Dendrocalamus, Bambusa, Thamnocalamus, Borinda, Ampelocalamus, Cephalostachyum, Drepanostachyum, Himalayacalamus, Melocanna, Yushania,* and *Arundinaria.*

26. Achet *et al.* (1993): The study was conducted in Rapti zone in Midwestern Development Region. There is a substantial number and quantity of NTFPs available in the Rapti zone. Subsistence consumption is relatively low except chiuri (*Bassia butyracea*). Virtually, all the NTFPs found are collected are traded.

27. Edwards, D.M. (1993): NTFPs from the Middle Hills of Nepal are marketed through various channels. The author suggested that since market information in this locality is already good, the best intervention to improve collectors' incomes would be to develop local cultivation and processing of NTFPs.

28. New Era (1992). The study is based on a field work conducted in NTFP trading route/corridor of Nepalgunj –Ghorahi-Tulsipur-Salyan-Pyuthan and looked at the possibility of NTFP based enterprise development in the corridor. The study provides the list of 14 main NTFP species and their quantity collected/traded in the region. The paper analyses policies related to NTFPs and NTFP based enterprise development. Besides that paper also analyses socio-economic value of NTFPs in the region and provides the sustainable management practices and cost benefit analysis of planting and processing Chiuri (*Bassia butyracea*), Timur (*Zanthoxylum armatum*), Mentha (*Mentha arvensis*) and Ritha (*Sapindus mukorossi*).

29. Amatya (1988): The paper suggests that the principles of agroforestry could also be well applied in the development of MAPs, with one possible model being their intercropping with different tree crops. According to the author, there are more than 700 different MAPs species of medicinal and aromatic plants in Nepal and distributed in all the physiographic regions of the country. The distribution has been found to be approximately 31% in tropical and subtropical zones, 55% in temperate zones, and 14% in alpine regions. The paper suggests that appropriate technology that can combine MAPs and trees to yield products suitable for the community in perpetuity must be identified. This paper also examines the potential for combining MAPs with trees and discusses the prerequisites.
30. HMG/N (1988): The Master Plan for the Forestry Sector has been prepared for 20 years. It outlines the policy action on NTFPs under production such as: (i) medicinal and aromatic plants; (ii) lokta paper; (iii) pine resin; (iv) sal seeds; (v) katha and cutch; and (vi) sabai grass. Information includes sources, collection system, and royalty, processing and marketing. The constraints on

development of NTFPs industries and strategies for overcoming these are outlined. Development objectives for the NTFP sub-sector are to increase availability of products needed for subsistence, to provide opportunities for income generation, to gradually shift from collection from the wild towards plantations and systematic resource management, and to add value through processing. A development Programme to promote the production, processing and marketing of NTFPs is drawn up; it includes primary components involving increasing profitability and economic returns to collectors, cultivation and development of industries. Supportive components include strengthening of institutional support and increased research and development.

Chapter 3

Institutions involved in cultivation and management

The commercialization of NTFPs through increased cultivation and sustainable management practices is important before any further steps such as primary and secondary processing in Nepal. This is also important to sustain livelihoods of the stakeholders involved, that includes socially and economically disadvantaged groups in the region. In the above context and for the conservation and sustainable development of NTFPs in the tropical regions of Nepal, one should have to look at the institutions that can play role in development of NTFPs in the region. The institutions involved in cultivation and management practices, including in-*situ* and ex-*situ* conservation efforts and their strengths and potential role needs to be analysed.

This chapter provides the analysis of institutions involved in promotional activities related with NTFPs. The strength and potential role of these institutions in the future NTFPs development in the tropical region need to be looked at. Also included in this chapter is the analysis of research efforts on NTFPs in Nepal.

3.1 Institutions involved in NTFP promotional activities

There are many organizations in Nepal that are in some way linked with NTFPs activities. The section gives a glimpse of activities of these organisations and their strengths/role in the field of NTFP promotion and development in the Terai region.

3.1.1 Ministry of Forests and Soil Conservation (MFSC), and its Regional Offices

The MFSC role in promoting NTFPs cultivation and management is important as it is the body, which develops policy and plan for the development of Forestry Sector that includes NTFPs in Nepal. The MFSC has prepared the Master Plan for the Forestry Sector in 1988. It has recently revised the forestry sector policy in 2000. It is actively involved in developing policy action, planning, and implementation aimed at the conservation and sustainable development of NTFPs in Nepal. There are five departments under the MFSC, namely (1) Department of Forests (2) Department of Plant Resources (3) Department of Forest Research and Survey (4) Department of National Parks and Wild Life Conservation and (5) Department of Soil Conservation and Watershed Management. It monitors and evaluates the activities of the departments under it. Besides that it also monitors, regulates and supervises activities of forest products and NTFP processing companies (both under it and in private sector). The Ministry has 5 regional offices representing all the development regions of Nepal. Besides that there are 5 regional training centres having DANIDA support, which provides training on the various aspects of forestry that includes training on NTFPs cultivation and management to the forestry staffs, CFUGs, and leasehold forestry groups.

3.1.2 Department of Forests (DOF)

The DOF is the oldest department under the MFSC. The DOF has the central, district and range level organisational units, which mainly involves in conservation and management of forest resources of Nepal and to meet the demand of forest products need of the country. It has activities in all the districts of Nepal (except Mustang district). The DOF's main responsibilities are: (1) to assist Ministry in formulating policies, Acts, Rules and Regulations for the conservation of forest resources of Nepal, (2) to implement and coordinate forestry development plans and programmes, (3) to mobilise participation of the local people through providing them the information on forest management, plantation and importance of forestry in natural balance, and (4) to prepare and implement programmes for scientific forest management.

Non- timber forest products are considered as an integral part of the Department of Forest 's responsibilities. The District Forest Officer (DFO) executes a forest management plan in the district, which involves protection, management and utilization of forest products including NTFPs. Besides execution of the management plan, DFO is also responsible for issuing permits for collection of NTFPs, collecting royalties, and inspecting and recording the forest products being transported. Similarly, the DFO is also responsible for the management of forest resources in the government forests that are dictated by the forest rules and regulation. District Forest Office supports to allocate land for community forests, leasehold forests and manage and organize Community Forest Users groups. The users group is responsible to maintain NTFPs in their community forests.

3.1.3 Department of Plant Resources (DPR)

The DPR, since its establishment with its limited resources is in its utmost to provide each year nominal basic facilities to the scientists to collect and contribute on Nepalese flora. The Department is responsible for conducting exploration, preservation of the herbarium specimens, publication of the flora, conservation of endangered, threatened, rare and endemic plant species in different phytogeographic belts of the country, assist the people for scientific research on processing, production and utilization of various plant resources.

DPR extends its conservation and extension activities through botanical gardens, conservatories and nurseries in seven District Plant Resources Offices located at different climatic zones viz. on West – Banke, Dhakeri (Tropical); Jumla, Dhitachour (Alpine); Salyan, Mulpani (Temperate); Kailali, Devariatal and Godawari (Tropical); on Central- Makwanpur, Vrindavan (Tropical), Tistung and Daman (Temperate); on East - Ilam, Maipokhari (2100m- Temperate); Dhanusha, Dhanushadham (Tropical). The Department has conserved 1500 species and 100 medicinal and aromatic plants in its Botanical Conservatories. The main targets of DPR offices are germplasm conservation research and development of cultivation technology of medicinal and aromatic plants (MAPs) and training on MAPs.

3.1.4 Department of Forest Research and Survey (DFRS)

The DFRS was established in 1963 as the Forest Resources Survey Office under the Department of Forests. After several intermediate organisational changes, it has taken its present name in 1999. The DFRS under the MFSC has responsibility to carry out research and survey works in all aspects of forestry throughout the country. The department has research stations located at various parts (both Terai and Hills) of Nepal and also has remote sensing facilities, only one within the MFSC. The department is mandated to fulfil two basic objectives, which are: (i) to provide research information required for forest management and (ii) to update information on forest resources. It has very highly trained forestry professional staffs with research and survey experience on various forestry fields. The DFRS is involved in identifying and developing the technology related to NTFPs cultivation, conservation and management.

The department has carried out various research activities on various aspects of bamboo and rattans. Beside that it also carries out agroforestry research activities that include planting trees, medicinal and aromatic plants. It also has nurseries where propagation trials of various plant species including NTFPs are conducted. Its other strength is the capacity to conduct forest resource inventory.

3.1.5 Department of Soil Conservation and Watershed Management (DSCWM)

The DSCWM through its 55 district offices is responsible for soil and water conservation programmes both in government and private lands. It works in partnership with the local people and conducts participatory action for the conservation of sensitive watersheds and their catchments areas. Its activities are based on watershed or subwatershed level. It applies bioengineering techniques to conserve soil and watershed using trees and NTFPs having good soil binding properties such as vetiver, bamboo and broom grass.

The department's role in the NTFP development in the Terai region can be important as it can help promote NTFP cultivation and management in the watershed areas and on the farmlands in area of its activities.

3.1.6 Department of National Parks and Wildlife Conservation (DNPWC)

The DNPWC is responsible for protecting flora and fauna and to maintain biodiversity within Nepal through the network of protected area, which covers more than 16% of Nepal's land area. The network represents most of the major ecosystems of Nepal, including 9 national parks, 3 wildlife reserves, 3 conservation areas, and 1 hunting reserve. Five of these protected areas lie in the Terai region of Nepal. The department has recently brought the new concept of buffer zone forest user groups and has emphasised the need of local people's participation in conservation activities. It has recently brought the national wetland policy aimed at conservation of aquatic flora and fauna of Nepal in line with International Convention of Wetlands.

The department's role in the NTFP sector will be particularly important in the field of in-*situ* and ex-*situ* conservation of NTFP species in the Terai region of Nepal.

3.1.7 Herbs Production and Processing Co. Ltd. (HPPCL)

HPPCL is a public sector company under the Ministry of Forests and Soil Conservation and conducts commercial farming of herbs and aromatic plants. It has got 300 ha land for farming, particularly in Terai and Inner-Terai and also has its own processing plants. At present, the HPPCL is engaged in commercial cultivation of some exotic species of aromatic plants such as palmarosa (*Cymbopogon martini*), citronella (*Cymbopogon winterianus*), lemon grass (*Cymbopogon flexuosus*), Japanese mint (*Mentha arvensis*), German chamomile (*Matricaria chamomilla*), French basil (*Ocimum basilicum*), and a few indigenous species such as tagetes (*Tagetes minuta*). Domestication of *Nardostachys jatamansi, Valeriana wallichii*, and *Swertia chiraita* is being considered. Jatamansi oil and *Zanthoxylum* oil are also commercially produced. Commercial distillation of oil from Sugandha kokila (*Cinnamomum glaucescens*) has been patented by HPPCL. Besides that, it promotes local participation in sustainable collection, cultivation, and production, processing and marketing of MAPs. It produces around 20 tons of essential oil annually (excluding turpentine).

It also buys herbs produced on the farmers land. It provides assistance in production, processing and marketing the farmers' products. The HPPCL role can be important in promoting NTFP species' cultivation and sustainable management in the Terai and Inner-Terai regions of Nepal.

3.1.8 SinghDurbar Baidyakhana Bikas Samiti (SBBS)

It is a very old institution and was established around 300 years ago during the Malla Kings rule in Kathmandu valley. It was moved to SinghDurbar during the Rana rule and was originally known as Singhdurbar Baidyakhana under the management of the his Majesty's Government.. It has become a Development Board known as SinghDurbar Baidyakhana Bikas Samiti (SBBS) in 1994, with an increased autonomy to promote NTFPs and Ayurved-based medical treatments in Nepal. The SBBS has played an important role in the development of herb-based Ayurvedic treatments of many diseases through production of many Ayurvedic medicines. It is one of the largest consumers of NTFPs produced in Nepal and is also a major manufacturer of Ayurvedic medicines in Nepal. It has a pharmaceutical laboratory where it has machines for chemical analysis and making pharmaceutical products. It purchases herbs harvested/collected from local people. In Fiscal year 2001/02, it sold medicines worth Rs 22.45 millions and is expected to sell worth Rs 40 millions in 2002/03. It has started a construction of museum for herbal products and medicines. One of the aim of the SBBS is to promote NTFP based enterprise in the Terai, Midhills and High Mountains of Nepal and help promote conservation and sustainable development of NTFPs in Nepal.

3.1.9 Dabur Nepal

Dabur-Nepal is a multi-location, multi product enterprise for the herbal and Ayurvedic preparations. It has specialized in and assimilated the extensive knowledge in these areas. It is an Indian Venture Company established also in since 1989. In view of this, Dabur Nepal has started research and development projects on medicinal plants in Nepal to provide modern technology for sustainable cultivation of medicinal and aromatic plants to the farmers.

Dabur Nepal has established greenhouse facility at Banepa, Kavrepalanchok district, with a capacity to produce 3 to 4 millions seedlings of medicinal and aromatic plants per annum. It supplies the saplings of MAPS to the farmers directly or through NGO/INGO such as AEC, CECI, USAID, Peace Corpse, BSP, New Era, Leasehold forestry groups, DEPROSC-Nepal and Department of Forests charging cost price only. The farmers are given training and technical assistance for cultivation and management of MAPs. Dabur Nepal also provides the buyback guarantees to the producers. However, the company itself fixes the price. It is also involved in collaborative MAPs research and developmental work with Hill Agriculture Research Project and ICIMOD.

3.1.10 Asia Network for Sustainable Agriculture and Bio-resources (ANSAB)

ANSAB is working in the field of bio-diversity conservation of the far-western mountain districts, such as Bajhang, Dolakha, Baglung and Jumla. It is doing so through its various programs like enterprise-based bio-diversity conservation, by promoting community based forest enterprises, market information system for NTFP and certification and sustainable marketing of NTFPs. In its program, there are elements of NTFPs promotion by initiating the FUGs to include NTFPs in the forest management plans. The organization helped identify NTFP promotion intervention such as training and marketing. ANSAB accomplished a programme at the central level to improve the MIS system geared towards the benefits of traders and collectors of NTFP for equitable benefits. ANSAB at present has no activity on NTFP in the Terai and Inner Terai regions but its experience in the Midhills and high mountains may be useful for implememting the NTFPs development programmes in the Terai and Inner-Terai.

3.1.11 Canadian Center for International Studies and Cooperation (CECI –Nepal)

CECI/Nepal since recent past has been involved in the natural resource management of the selected far western districts of Nepal. CECI-Nepal was involved in NTFPs Programme in Community Based Economic Development Project (CBED), IDRC supported projects in Dadeldhura, Baitadi and Jumla districts. It was involved in the development of methodologies for sustainable management of endangered and high value medicinal plants in Jumla. In 1997-98 it had conducted field-testing of methodology for NTFP inventory taking of NTFPs and provided recommendations for future inventories. Information dissemination on the management and marketing of

endangered and high altitude medicinal and aromatic plants as well as their conservation for sustainable livelihood were some of the on-going programs of CECI/Nepal. At present CECI is also involved in NTFPs activities IDRC supported projects.

3.1.12 Livelihoods and Forestry Programme (LFP), Terai Component

LFP Terai has initiated the forestry development programmes for sustaining rural livelihoods in the three Terai districts, namely Rupandehi, Kapilbastu and Nawalparasi of western Nepal. It aims to improve livelihoods for all, especially the poor through better access to, and utilization of the products and services from Terai forests. LFP promotes conservation and sustainable management of NTFPs, such as grasses, fodder and medicinal plants, which can help improve livelihoods of many socially and economically disadvantaged groups. It emphasises the local people's involvement in the planning process and in management of forests.

3.1.13 Biodiversity Sector Programme for Siwaliks and Terai (BISEP-ST)

The MFSC initiated the Biodiversity Sector Programme for the Siwaliks and Terai with the help of SNV Nepal/Dutch International Cooperation to look into opportunities to conserve and manage Terai and Siwalik forests in the 8 districts of Central Development Region of Nepal. In the second half of 2001 and early 2002 the BISEP-ST programme conducted a series of eight stakeholder workshops in the eight Central Region Terai districts to address the issue of forest management in the Terai and Siwaliks. A multi-stakeholder platform has been created in these districts for effective communication, collaboration and planning at district level. One of the programmes of the BISEP-ST is to help sustain rural livelihoods through conservation, cultivation and sustainable utilisation of NTFPs in the area of its activities.

3.1.14 GTZ/Churia Forest Development Project, Lahan

The project was involved in NTFP related activities such as cultivation, land productivity increment by introducing NTFPs, protection of valuable species and improve economic opportunity by promoting NTFP processing and marketing. The promotion of NTFP processing and marketing was confined to the low-income groups of Siraha and Saptari. Two community-based organizations were actively involved in processing and marketing of NTFPs.

3.1.15 Department of Roads (DOR)

The department is responsible for maintaining the roads within the country. It emphasizes use of bioengineering techniques for erosion prone roadsides, mostly using NTFPs. It also carries out avenue plantation on roadsides, mainly in urban areas and also on highways. Its role will be particularly important for the establishment of demonstration plots on the roadsides on NTFP species.

Roadsides NTFP plantation can be an ideal place for promoting NTFP species through visualizing the demonstration effects propagation, cultivation and management techniques of NTFP species. Its nurseries can be an ideal place for the propagation of NTFP species.

3.1.16 RADP CARE International in Nepal

RADP CARE is basically involved in conducting seminars, workshops and NTFP management training and other types of training programmes to create a common forum for all the stakeholders working in the field of NTFPs, to identify the problems and constraints on cultivation, collection and processing and marketing of NTFPs. It is also working in Bajhang district in the identification of the NTFPs and medicinal plants. They have provided training to FECOFUN members on Chiraito (*Swertia chirayita*) cultivation and nursery management and the sustainable harvesting, management and marketing and networking system development. It had provided support to establish NTFP enterprises producing Allo and Bhangro products in Bajura district.

3.1.17 SNV/Nepal, Bakhundol

The SNV/Nepal is contributing to biodiversity conservation and sustainable management of resources through increased benefits to forest users. One of the major programs is national capacity building for promotion of community based forest enterprises in Nepal. In this context, capacity building has been initiated through national partners in the NTFP sub-sector. It is basically trying to deliver the business development services to forest based enterprises and has contributed to policy advocacy, reform and implementation of community forestry and NTFP enterprises.

3.1.18 DEPROSC/Nepal, Tinkune

Development Projects Services Center (DEPROSC) Nepal is involved in the identification of strategic NTFPs for poverty reduction programs in collaboration with ICIMOD, Dabur/Nepal and IFAD. Capacity building of 60 CFUGs for NTFP harvesting, capacity building of 230 leasehold forest groups of poor farmers for cultivation of NTFP and marketing were among the major programs initiated by DEPROSC/Nepal.

3.1.19 Municipalities

With the increasing concern of environment the Kathmandu Metropolitan City has launched a programme to maintain park and greenery within Kathmandu Valley where NTFPs are included. Similarly, many other municipalities located in the Terai have the interest towards NTFPs.

3.1.20 Religious Trusts

Religious trusts are also helping to maintain NTFPs within the areas such as Shlesmantak Ban, Swayambhu Ban, and Maipi Ban. Many of the trusts in the Terai and hills have NTFPs in the forests and have kept NTFPs conserved in its forest area including bamboo and rattans. However, most of them do not have any conservation strategy for the NTFP resources.

Private and Public institutions

Private and public institutions are involved in landscape development work, planting NTFPs trees in memories of martyrs and political leaders. Likewise Hotel Association of Nepal (HAN) and mineral water companies such as AQUA are requesting the municipalities for space for their advertisements. The Municipalities provide certain areas for parks and traffic islands where these institutions maintain landscapes and with their advertisement as well.

3.2 Research efforts on NTFPs in Nepal

There are various organizations involved in research activities related to NTFPs. MFSC and its departments, regional offices and district forest offices are involved in NTFPs based various research and developmental activities in their respective agro-ecological zones.

However, Department of Plant Resources is one of the oldest organizations involved in research and development of NTFPs, particularly medicinal and aromatic plants (MAPs) in Nepal. Department of Plant Resources (DPR) and farms and stations of state machinery are involved in research and developmental activities in various agro-ecological zones. The Department has already recommended cultivation management techniques of some important NTFPs.

Similarly, the DFRS is involved in conducting propagation, silvicultural and management trials of the tree species, including bamboos and rattans. DFRS has also conducted agroforestry trials incorporating NTFPs with tree species at Tamagadhi in collaboration with HPPCL and at Tarahara in eastern Nepal in collaboration with Tarhara Agricultural Farm. The research recommendations are published in various forms of research paper, books and booklets.

DNPWC is actively involved in NTFPs conservation. HPPCL is conducting research on cultivation and processing of NTFPs in the Terai region.

In close collaboration with Hill Agriculture Research Project, Dabur-Nepal is conducting research on introduction of high value medicinal plants and tree species in agro-forestry system since 1999 in Nuwakot district. Similarly, Dabur-Nepal in collaboration with Development Project Services Centre (DEPROSC) Nepal and International Centre for Integrated Mountain Development (ICIMOD) is also involved

in trial demonstration of medicinal and aromatic plants in Humla and Jumla Districts under Upland Poverty Alleviation Project supported by IFAD since 2002.

Nepal Agricultural Research Council (NARC) is also conducting research on medicinal plants since 1994 at Regional Research Centres, at Pakhribas and Lumle, where propagation method for some NTFPs has been identified and is generating technology for Chiraito cultivation for extension programme.

Socio-economic Agro-forestry Environment Concern (SAFE-Concern), a Kathmandu based NGO is also extensively involved in MAPs research for the mid-hills of Nepal by establishing four MAPs nurseries in Bhaktapur and Kavreplanchok districts by involving local FUGs and farmers. It is also conducting research on organic farming.

HPPCL is also involved in small-scale research to identify the variety, fertilizer requirement and spacing for their own commercial cultivation and extension programme of aromatic plants.

Canadian Center for International Studies and Cooperation (CECI–Nepal) is involved in NTFPs research and developmental programmes in Jumla, Dadeldhura and Baitadi districts.

Tribhuvan University, Institute of Forestry (IOF) has included NTFPs as an elective course in Bachelors level. Emerging interest on NTFPs among the students has played a significant role to establish coordination and linkage between the DPR and IOF to develop course curriculum and research activities. Similarly, as a part of postgraduate research programme Tribhuvan University, Department of Botany has provision to offer NTFPs research projects to their fellow students.

Chapter 4

Conservation and Management Practices of NTFP in Nepal

4.1 Introduction

Nepal extends from flat plains in the south to the Himalayas in the north with an altitudinal range of 50m to 8848m above sea level (HMG/N/ADB/FINNIDA, 1988a; Jackson, 1994). Although a small country (147,181 km^2), Nepal's diverse topography is gifted with a vast range of altitudinal and climatic zones. The rich biological diversity (agricultural and forest land) fostered by climatic and topographical variations is further enhanced by Nepal's location at the junction of the paleartic and oriental biogeographical regions.

Nepal is positioned to offer the diversity of 6 phytogeographical provinces, 10 bioclimatic zones, 35 forest types and 75 vegetation types. All these factors contribute towards biodiversity richness as Nepal has more than 6,500 species of flowering plants, over 1500 species of fungi, 350 species of lichens, over 170 species of mammals, 844 species birds, 180 species of fish, 635 or more species of butterflies and more than 6,000 species of moth in Nepal. The rich bio-diversity in Nepal includes a wide range of high value NTFPs. They may be gathered from the wild, produced in forest plantations and trees outside forests.

4.2 Deforestation and its effect

There has been a sharp decline in both the area and density of forests in Nepal. At present, forests in Nepal represent about 39.6% of the total land area, of which 10.6% is comprised of degraded forest and scrubland. The annual rate of deforestation is estimated at about 1.7% between 1985/86 and 1994/95 (CBS, 2000). According to the Ninth Five Year Plan document (1998), the area covered by forests in 1964 was 43%, and it reduces to 37% in 1986, and decreased further to 29% in 1998. Nowadays, obtaining forest products has become more difficult in Nepal. This is not much due to the decline in forest areas but due to forest degradation. More forests have become shrub land (11% of the total forest area). The next 10% of the forest area has less than 40% crown cover (Sharma, 1991).

Excessive deforestation does multiply economic, environmental and social ills. But in most cases it tends to be an incidental sign rather than a primary cause of forest loss. Measures to protect the soil and stabilize run-off of topsoil are extremely important in a country like Nepal. Furthermore, it is clear that forest products and tree resources can be-and often are- produced and harvested along sustainable line, to the lasting benefit of forests and all those who depend on them. His Majesty's Government of Nepal is well aware of the importance of measures to maintain the supply of forest produce and prevent deterioration of the forest. In 1976 it introduced the National Forestry Plan (NFP, 1976), which includes provisions both for improved protection and management of natural forests and for increased afforestation. In 1988, this was

further supported by the Master Plan for the Forestry Sector (Ministry of Forests and Soil Conservation 1988), which went on to questions of future supply and demand of forest products in detail.

4.3 Conservation status of NTFPs

Nearly 750 medicinal and 50 plants of timber value have been recorded (Adhikari, 2000). Similarly, 2000 Nepalese plants reported to have medicinal properties. Among them 1463 are known to be used locally (Shrestha and Shrestha 1999), and many are demanded by Indian manufacturer of Ayurvedic prescription (Shrestha 1994). The importance of medicinal and aromatic plants is due to poor access to modern health facilities and in many cases also preference, wild medicinal plants are an important part of the local health care. As a result, people have been using plants for medicinal purposes since long time and few people would contest their right to do so. Similarly, trade of MAPs raw and processed material, to among others, Indian ayurvedic medicine producers and perfume industry provides crucial income to rural collectors (CECI 1999). Commercial collection is thought to threaten the resources. As a result 13 MAPs species are listed to be either endangered (*Rauwolfia serpentina* and *Dactylorhiza hatagirea*), vulnerable (*Podophyllum hexandrum, Swertia chirayita, Paris polyphylla, Picrorhiza scrophulariiflora and Nardostachys grandiflora*) and commercially threatened (*Dioscorea deltoidea, D. prazeri, Aconitum laciniatum, A. spicatum, A. ferox* and *Bergenia ciliata*) (Red data book Categories used by ICUN) due to commercial collection for export (Shrestha and Joshi 1996).

District Forest Office records on issuance of NTFP and revenue collection gives some indications on the trend of NTFPs exploitation but often confusion is created as the existing recording systems adopted by custom officials as all NTFPs are placed on one heading or classified as miscellaneous item. It has also been reported that illegal trade of medicinal plants is extensive (Aryal 1993 and Yonzon 1993).

On national level, quantitative assessment, intensity/density of MAPs has not yet been carried out. The conservation status of NTFP resources varies, if various stakeholders' views are taken into consideration. The government officials and forestry professionals in the forestry sector are of the view that for the conservation of NTFP and to determine their status, quantification through resources inventory is necessary. However, using data of government permit issued may provide a good estimation of the NTFPs resources. During field surveys, it was realized that increase of market access and population pressure resulted into the overexploitation of NTFPs and decline in resources availability. On the other hand, traders perceive that access to market provide an incentive to sustain the resources and can help promote ex-*situ* and in-situ conservation and domestication of NTFP resources.

4.4 Social and economic significance of NTFPs and its possible implications

NTFPs involve numerous dimensions of economic and social significance to mankind. These dimensions include commercial (including domestic consumer markets,

industrial uses, export), household uses (direct collection and consumption by households) and recreational services as well. The social dimension is further enhanced by the fact that NTFPs are available for all people regardless of forest ownership, and are often available for communities and regions with fewer opportunities. NTFPs also have an important role in maintaining or strengthening the importance of forests among rural and urban citizens.

In addition, the utilization of ancient NTFPs is a direct continuation of human tradition, and may therefore serve as a cultural bridge between past and present generations. As the multitude of NTFPs also represents a non-negligible sample of the biodiversity of forests, their proper management also supports conservation related values. Indeed, the contribution of NTFPs to economic, ecological and social sustainability of forestry cannot be regarded as a minor one (Saastamoinen, 1998)

The expanding market of NTFPs on the one hand, and the challenge of improving rural livelihood on the other, demand a more sustainable, efficient and equitable management of NTFP resources in a framework that provides opportunities to growers, collectors, local traders and the end consumers. The implications of these issues are drawn in the economic cultivation and management aspects of the NTFPs.

Awareness about the crucial role that the NTFPs play in supporting the livelihoods of the forest-dependent communities has grown manifolds in the recent years. Policy makers, funding organizations, governments and voluntary organizations working in the forestry sector are convinced that sustainable management of NTFPs has become an inseparable part of pro-poor forest management practice. For harnessing the potential of NTFP resources as a means to raise the income standards, adequate knowledge about the theory and practice of NTFP resource production, harvesting, processing and marketing is a pre-requisite. Hence, in the field of sustainable NTFP cultivation and management, the focus has now shifted to activities that can directly contribute to the development of the sector.

4.5 Cultivation and management practices including conservation status of NTFPs in the study area

HMG/N through its forestry development programmes has encouraged protection, cultivation and management of high value NTFPs in various category of forestland and also in private farms. A brief synopsis of cultivation and management practice, including in-*situ* and ex-*situ* conservation and domestication in the Terai and Inner-Terai region by various stakeholders are presented below:

4.5.1 Commercial cultivation of NTFPs in Nepal

Findings of the Research and Development efforts carried out in the Department of Plant Resources have been commercialised through the Herbs Production & Processing Co. Ltd. The efforts have been successful in cultivation and processing of some exotic aromatic plants in the country. Presently, commercial scale cultivation

and value added productions of following MAPs are in practice: *Cymbopogon winterianus* (Citronella), *Cymbopogon flexuosus* (Lemongrass), *Cymbopogon martinii* (Palmarosa), *Matricaria chamomilla* (Chamomile), *Ocimum basilicum* (French basil), *Mentha arvensis, Tagetes glandulifera, Eucalyptus camadulansis, Tagetes minuta* etc. These plants are processed for producing essential oil for domestic and export purpose.

Some natural occurring and indigenous medicinal and aromatic plants that are commercially processed in the country are as follows:

Gaultheria fragrantissima (Wintergreen), *Nardostachys grandiflora* (Jatamanshi), *Parmelia nepalensis* (Lichens), *Zanthoxylum armatum* (Timoor), *Cinnamomum glaucescens* (Sugandh kokila), *Cinamomum tamala* (Tej pat), *Rhododendron anthopogon* (Sunpati), *Juniperus communis* (Juniper berry and leaves), *Acorus calamus* (Calamus), *Curcuma zedoria* (Kachur), *Artemisea dubia* (Artemesia), *Taxus baccata* (Loth Salla) etc. A brief synopsis of cultivation management practice is presented below.

4.5.2 Cultivation under Leasehold Forests

In Chitwan district, Leasehold Forestry Programme runs in eight hilly VDCs. The objective of these Leasehold Forests is to raise the income of poor people (below poverty line) and to improve the ecological conditions of the environment of the forest area, provide training on NTFP promotion and cultivation, and raise awareness and income activities. The leasehold forestry members have cultivated 1500 clumps of bamboo, 400 seedlings of Sugandha Kokila (*Cinnamomum glaucescens*) and 4000 Kurilo (*Asparagus racemosus*) plants in the year 2001/02. Details of plantation between 1998/99 and 2000/02 are presented in Table 4.1.

Table 4.1 Cultivation status of NTFPs under Leasehold Forests in Chitwan district

S.N	Local Name	Botanical Name	1998/99		1999/00		2000/01		2001/02	
			Nos.	Area (ha)	Nos.	Area (ha)	Nos.	Area (ha)	Qty	Area (ha)
1.	Amliso	*Thysanolaena maxima*	200	0.05	120	0.05	-	-	15	0.05
2.	Bans/ Nigalo	*Bambusa/ Drepanostachyum* sp.	490	>1	400	>1	1350	>3	1500	>3<4
3.	Kurilo	*Asparagus racemosus*							4000	>. 0.5
4.	Sugandha kokila	*Cinnamomum glaucescens*							400	0.25

Source: Field survey 2002

The Table shows that Amriso (*Thysanolaena maxima*) and Bans (*Bambusa/Drepanostachyum* sp.) are well adopted and Sugandha Kokila (*Cinnamomum glaucescens*) and Kurilo (*Asparagus racemosus*) are emerging as potential NTFPs under cultivation in those particular localities. Overall conservation

status of NTFPs under leasehold forests of some of the surveyed districts is presented in Table 4.2.

Despite lack of proper processing facilities Table 4.2 reveals that both in-*situ* and ex-*situ* conservation and management of NTFPs under leasehold forests is an emerging enterprise. This should be boosted up by providing necessary support like processing facilities, technical know-how of cultivation and conservation techniques of NTFPs.

Table 4.2 NTFPs Species Cultivated and their Conservation Status in Leasehold Forests of Central Region of Nepal

Name of LF	District	Area (ha)	Dominant NTFPS	Botanical Name	Conservation Status		Remarks
					In-*situ*	Ex-*situ*	
Ichakamana	Chitwan	2.6	Amliso	*Thysanolaena maxima*	Y	Y	Gurung/
			Bans	*Bambusa/Dendrocalamus* sp	Y	Y	
			Molasis	*Melinis minutiflora*	N	Y	Dominance
LF			Nigalo	*Drepanostachyum* sp.	Y	Y	Damai
			Sarpagandha	*Rauvolfia serpentina*	Y	N	
			Stylo	*Stylosanthes guyanesis*	N	Y	Ethnic
			Sugandha kokila	*Cinnamomum glaucescens*	Y	N	
			Amriso	*Thysanolaena maxima*	Y	Y	
Langali	Chitwan	1.6	Bans	*Bambusa/Dendrocalamus* sp	Y	Y	Magar
			Barro	*Terminalia bellirica*	Y	N	
			Harro	*Terminalia chebula*	Y	N	
			Napier	*Pennisetum purpureum*	N	Y	Dominance
LF			Nigalo	*Drepanostachyum* sp.	Y	Y	Ethnic
			Sarpagandha	*Rauvolfia serpentina*	Y	N	
			Sugandha kokila	*Cinnamomum glaucescens*	Y	N	
			Amliso	*Thysanolaena maxima*	Y	Y	
Ramanthali	Chitwan	7.5	Bans	*Bambusa/Dendrocalamus* sp.	Y	Y	
			Kurilo	*Asparagus* sp.	Y	N	
			Lemon grass	*Cymbopogon flexuosus*	N	Y	
			Molasis	*Melinis minutiflora*	N	Y	
LF			Nigalo	*Drepanostachyum* sp.	Y	Y	
			Sarpagandha	*Rauvolfia serpentina*	Y	N	
			Stylo	*Stylosanthes guyanesis*	N	Y	
			Sugandha kokila	*Cinnamomum glaucescens* *	Y*	N	

Source: Field Survey.

Note: * Represents in-*situ* conservation of Sugandhakokila, Y=specified NTFP is under in-*situ* conservation N=specified NTFP is not under in-*situ* conservation

4.5.3 Cultivation under Community Forests

Forest User Groups (FUGs) are independent and autonomous local non-governmental organization. Autonomous and independent status of the Community Forest has been provided by the forest legislation. The CFUG members manage their CF in partnership with the District Forest Office. The community forestry development programme of Nepal encourages CFUGs to cultivate NTFPs in their CF and raise the income level of community members. CFUGs are also responsible to prepare and follow the operational plan for the management of resources in the community forest. The detailed status of conservation of NTFPs in community forests visited during the field is given in Annexes 3-7. The findings of some case studies conducted during the field study at Chitwan, Makwanpur and Bara districts are presented below.

Chitwan district

There are 14-community forests in Chitwan district. Due to lack of knowledge about utilization and marketing values, the NTFP promotional activities is not expanding. The resource inventory of NTFPs in the district is not yet carried out. So, the quantity and species of NTFPs available in the district is yet to be determined. Similarly, due to lack of information on NTFP habitat, cultivation and domestication process and untrained staff and forest users, NTFP promotional activities is not progressing well. There are only 200 seedlings of kurilo (*Asparagus racemosus*) planted in the Community Forests, despite its good market potential.

Raniban Community Forest, Makawanpur

The Raniban CF was handed over to the Raniban FUG in 1990. Initially, the Raniban CF was extensively involved in protection and collection of both timber and non-timber forest products. Realizing the importance of NTFPs, *in-situ* conservation under traditional management practices has been started. Furthermore, only protection and collection did not-last for longer. The CFUG members have initiated *in-situ* conservation in the beginning and followed cultivation of *Asparagus* sp. and bamboos by purchasing seedlings from local nursery (Joshi Nursery). The CFUG members have realized in recent days about the income generation potential through planting bamboos. The conservation (in-situ/ex-*situ*) and domestication of *Asparagus* sp. seemed to be a profitable business. The Raniban CF made an adoptive reseach on asparagus cultivation. According to their research, two years old asparagus plants produce on an average of 5 (4-7) kg fresh weight of root harvest. And after processing about 1 to 1.2kg marketable roots were obtained per plant.

Pragtisil Community Forest, Simra, Bara

A short visits to Pragatisil Community Forest of Bara district and assessment of NTFPs *in-situ* indicated the keen interest of the CFUG in NTFP cultivation and management. The species identified during the field visit to the community forests having uses, as NTFPs are Kurilo, Harro, and Barro. The Pragatisil CF has already established a nursery where *Eucalyptus* sp. was major NTFPs in the nursery. However,

the CFUG members have already realized the importance of NTFPs and hence have included NTFPs cultivation in their annual operational plans.

4.5.4 Rattan cultivation and in-*situ* and ex-*situ* conservation

Sati Karnali Community Forest of Kailali district and national forest of Suryapatuwa VDC of Bardia district were recorded as prime examples of rattan cultivation. The rattan species cultivated or conserved in Nepal is *Calamus tenuis* (Pani bet), which also has good commercial value. Rattan is an important NTFP species in Bardia and Kailali districts. *Tharus* is one of the major ethnic group using both of these forests. The community people are more conscious about conservation and cultivation of rattan due to different religious rituals.

Similarly, some farmers of eastern Terai and Central mid-hills initiated rattan cultivation in their marginal lands. Eight years ago, a rattan nursery was established in Madhumalla Nursery of Jhapa district. Similarly, 10 years ago, some farmers in Sunsari district initiated rattan cultivation in their private lands but both attempts were failed due to lack of protection (Chaudhary, 2000) and lack of awareness among farmers.

After protection and primary management of rattan forests, interventions were made in community managed rattan forests of Kailali, in coordination with International Network for Bamboo and Rattan (INBAR) Nepal, ANSAB, and Environment and Forestry Enterprise Activity (EFEA) of MFSC and CARE Nepal. Training and enterprises development works were conducted. The Programme focused on propagation, nursery management, cultivation, harvesting, storing, sorting, marketing and quality control. Management systems adopted by various stakeholders seem to be indigenous.

Information given in **Annexes 3 to 7** on the conservation status of NTFPs in the sampled FUGs imply that even though lot of works have been done towards in-*situ* conservation, very little work has been done towards ex-*situ* conservation. **Annex 8** summarizes the conservation status of NTFPs based on the field findings.

4.6 Region-wise Conservation Strategies, Cultivation and Management Practices, in relation to NTFP

The followings findings are drawn based on the five different regional level workshops organized by CEDA (2002) by involving stakeholders, and focus group discussions with the CFUGs.

- The choice of species for cultivation varies slightly with the regions.
- Conservation strategies are adopted by banning of open grazing systems.
- Some of CFUGs have already started or recently initiated cultivation of aromatic plants such as Citronella, Lemongrass, Chiraita (*Swertia Chirayita*), Mentha, Broom grass (*Thysanolaena maxima*), Rattan (*Calamus* sp.) and Dalchini

(*Cinnamomum tamala*). However, government support (technical know-how and training) to these growers is lacking.

- CFUGs lack the knowledge of proper NTFP inventory techniques in CF.
- The training to CFUGs and other farmers on cultivation and management of NTFPs is lacking.
- Lack of processing plants necessary for primary and secondary processing considered as obstacle for the promotion of NTFPs.
- Soft loans for promotion of NTFPs were stressed during the discussions.
- Domestication and *ex-situ* conservation of NTFPs should be promoted through establishment of NTFPs nurseries at different locations.
- CFUGs have started cultivation of Neem (*Azadirachta indica)*, Amala (*Emblica officinalis*), Asparagus, Bamboo and Rattan in central development region.
- Lack of quality seeds/seedlings and planting materials is an obstacle for the promotion of NTFPs.
- Institution such as CARE-Nepal had significantly contributed towards promotion of NTFPs cultivation, conservation and management in Midwestern Terai districts, however, there is no continuity of support at the moment as the project is already completed. Cultivation cum management training of NTFPs provided by Non-governmental Organizations is also not adequate.
- CFUGs in the Midwestern region have started cultivation of Sarpagandha (*Rauvolfia serpentina*), Babul (*Acacia nilotica*), Pipla (*Piper longum*), Kurilo/Satawari (*Asparagus* sp.), Harro (*Terminalia chebula*), Barro (*Terminalia bellirica*), Amala (*Phyllanthus emblica*), Bamboo (*Bambusa/Dendrocalamus* sp.), Rattan (Calamus sp.), Bakaino (*Melia azedarach*), and Neem (*Azadirachta indica*) in their community forests.
- In Farwestern region, CFUGs have already started cultivation of rattan under rotational harvesting system. Similarly focus has been given to cultivation and management of Pipla (*Piper longum*), Sikakai (*Acacia rugata*), Musali (*Curuculigo orchioides*) and Kauso (*Mucuna pruriens*).

4.7 Private growers

Cultivation of NTFPs in private land/ community land by the individual/ community growers has been recorded as a traditional practice. However, they were confined to subsistence level under homestead gardening or marginal land conditions. With the increasing market opportunity and availability of commercial cultivation techniques of some species, the trend of cultivation has been increased. This is evidenced by some of the examples given below:

Sanjantar (Basamadi), Makwanpur

Interaction with local traders helped gather information about 100 households of Sanjantar area of Makwanpur district involved in NTFP collection and cultivation. Majority of these households depend on NTFPs (about 60% of their household income was from NTFPs). Similarly, the traders and collectors realized that cultivation of

NTFPs in their private lands is a profitable business. As a result 7- 8 persons have already started cultivation of asparagus in their private marginal lands.

According to a prominent trader, there is a significant decrease in availability of NTFPs in the forests. It may be due to unmanaged over collection of NTFPs. A trader, who was interviewed, was found to have exported about 60 metric ton of NTFPs, annually. The trader has strongly recommended that there is a felt need to create awareness among the collectors particularly on sustainable and environmental friendly collection methods. On the other hand, Production Manager of Machhapuchre Herbal Private Limited of Basamadi reported that it was difficult to obtain raw materials, such as *Taxus* sp. that has to come all the way from high hills. This shows that the industries established in the Tropical part of the country depend on the raw material produced in the inaccessible subalpine and temperate areas and therefore suffer shortage of raw material.

Private NTFP growers in Dang district

Laxman Singh Thapa of Kabhre VDC-3, Gullepani, Dang district has started NTFP farming since 2000 AD in three hectares of land. NTFPs like Okhar (*Juglans regia*), Tejpat (*Cinnamomum tamala*), Amala (*Phyllanthus emblica*), Harro (*Terminalia chebula*), Barro (*Terminalia bellirica*), Kurilo (*Asparagus racemosus*), Timur (*Zanthoxylum armatum*), Samayo (*Valeriana jatamansi*), Chutro (*Berberis aristata*), Nundhiki (*Osyris wightiana*), Babiyo (Eulaliopsis binata) are under cultivation. Farming practice is inter-cropping and agro-forestry system. Initial harvesting of the crop is reported to have started.

Dev Mani Devkota of Bijauri VDC-4, Hemantapur, Dang district had started cultivation of NTFPs about 24 years ago in one hactare of land. Major NTFP species grown are: Pipla (*Piper longum*), Ritha (*Sapindus mukorossi*), Sugandhakokila (*Cinnamomum glaucescens*), Gurjo (*Tinospora sinensis*), Harro (*Terminalia chebula*), Barro (*Terminalia bellirica*), Bojho (*Acorus calamus*), Bijayasal (*Pterocarpus marsupium*), Rudraksha (*Elaeocarpus sphaericus*), and Lemongrass (*Cymbopogon flexuosus*). Seedlings of species like Amala (*Phyllanthus emblica*), Srikhanda (*Santalum album*), Bel (*Aegle marmelos*), Bijayasal (*Pterocarpus marsupium*), Ashok (*Saraca indica*), Kapur (*Cinnamomum camphora*), Kangiyon (*Grevelia* sp.), Koiralo (*Bauhinia* sp.), Agasti (*Sesbania grandiflora*), etc., are grown in the nurseries. They are grown in nurseries not only for plantation on his own land but also for selling to other cultivators. Cultivation of number of species although are diversified, quantity has been diversified to a marketable volume.

Private NTFP growers in Bardia district

Dev Rana of Gularia Municipality-1 of Bardiya district had been cultivating NTFPs in five Kattha (about 0.2 ha) of land since 23 years ago. Major NTFP species grown were Bet (*Calamus* sp.), Bans (*Bambusa/Dendrocalamus* sp.), Amala (*Phyllanthus emblica*), Kurilo (*Asparagus racemosus*), Sikakai (*Acacia rugata*), Gurjo (*Tinospora*

cordifolia), and Arjun (*Terminalia arjuna*). Mr. Rana was involved in commercial seedling production for sale as well.

Private farming status indicates that there are different species for different regions. For example Chiraito (*Swertia chirayita*), Sarpagandha (*Rauvolfia serpentina*), aromatic plants (Lemongrass, Citronella, Palmarosa, Mentha), Bamboo (*Bambusa/Dendrocalamus* sp.), Rattan (*Calamus* sp.) and Amliso (*Thysanolaena maxima*) are commonly grown in eastern region. Similarly, Sarpagandha (*Rauvolfia serpentina*), aromatic plant (Lemongrass, Citronella, Palmarosa, Mentha, Matricaria), Bamboo (*Bambusa/Dendrocalamus* sp.) and Kurilo (*Asparagus racemosus*) are grown in Central region. In Western region, Tejpat (*Cinnamomum tamala*), Amala (*Phyllanthus emblica*), Harro (*Terminalia chebula*), Barro (*Terminalia bellirica*), Kurilo (*Asparagus racemosus*), Timur (*Zanthoxylum armatum*), Chutro (*Berberis aristata*), Babiyo (*Eulaliopsis binata*), Pipla (*Piper longum*), Ritha (*Sapindus mukorossi*), Sugandhakokila (*Cinnamomum glaucescens*), Gurjo (*Tinospora cordifolia*), Bojho (*Acorus calamus*), Bijayasal (*Pterocarpus marsupium*), Rudraksha (*Elaeocarpus sphaericus*), Lemongrass (*Cymbopogon winterianus*), Bamboo (*Bambusa/Dendrocalamus* sp.), Rattan (*Calamus* sp.), Samayo (*Valeriana jatamansi*), Nundhiki (*Osyris wightinana*) were among the important species. Amala (*Phyllanthus emblica*), Kurilo (*Asparagus racemosus*), Sikakai (*Acacia rugata*), Amliso (*Thysanolaena maxima*) are the major NTFPs grown by the private growers.

4.8 Government Institutions/Farms

4.8.1 Herbs Production and Processing Co. Ltd. (HPPCL)

Visit to HPPCL farm and nearby area has revealed that aromatic plants are much more popular than medicinal plants under public and privately managed farms. It was mainly due to the buyback guarantees, technology and planting materials and processing plants provided by HPPCL. Since 1971, Tamaghadi farm, a branch office of HPPCL in Bara district has been involved in both research and developmental of NTFPs. However, available information shows that more focus was given to aromatic plants rather than medicinal plants. According to the farm manager Mr. Basant Chitrakar, the following species were tested and found feasible for cultivation. These include Palmarosa, Citronella, Lemongrass, *Mentha arvensis, Matricaria,* French basil, *Tagetis,* Holy basil, Sarpagandha (*Rauvolfia serpentina*), *Asparagus* sp., *Piper longum, Eucalyptus* sp., Tejpat (*Cinnamomum tamala*), Bamboo (*Bambusa/Dendrocalamus* sp.), Rattan (*Calamus* sp.), Sikakai (*Acacia rugata*), and Bel (*Aegle marmelos*). According to the growers, cultivation of Sugandhakokila (*Cinnmomum glaucescens*) was not found profitable under commercial farming.

Most of these species were recommended for commercial cultivation. However, mass cultivation of Palmarosa, Citronella, Lemon grass, Japanese mint, Matricaria and French basil was found prominent. The seed and seedlings of NTFPs species distributed by the HPPCL extension programme are presented in Table 4.3 and 4.4. The area under cultivation of NTFPs under farm condition at Tamaghadi is presented in Tables 4.5(a). Development efforts envisaged by HPPCL in community level cultivation of NTFPs in the different districts, area under cultivation and capacity of value added productions are presented in Table 4.5 (b).

Table 4.3 Seed/ seedling of NTFPs distributed by HPPCL in 2001/2002

NTFPs species	Distributed area	No. of cultivators involved
Japanees mint (*Mentha arvensis)*	Locally (Bara, Rautahat)	250
Lemongrass (*Cymbopogon winterianus)*	Whole Terai including tea company	10
Matricaria *(Matricaria chamomilla)*	Locally (Bara, Rautahat)	250
Palmarosa *(Cymbopogon martini)*	Locally (Bara, Rautahat)	10

Source: HPPCL (2002)

Table 4.4 Area under NTFPs under farmers field conditions in 2001/2002 supported by HPPCL Extension Programme (near by Farm area)

NTFP species	Area under cultivation (ha)
Japanees mint *Mentha arvensis*	80
Matricaria chamomilla	80
Total	**160**

Source: HPPCL (2002)

Table 4.5 (a) Area under NTFPs cultivation in HPPCL Farm

Common Name (Botanical name)	Area under cultivation ha.	Remarks
Citronella (*Cymbopogon flexuosus*)	60	
Eucalyptus camadulansis	2	
Japanees mint (*Mentha arvensis*)	5 Nurseries	for extension programme
Lemongrass (*Cymbopogon winterianus*)	75	
Matricaria chamomilla	2 Seed production	for extension program
Palmarosa (*Cymbopogon martini*)	40	
Total	**184**	

Source: HPPCL (2002)

Table 4.5 (b) Area under cultivation and capacity of value added productions of HPPCL by farms locations

Location of the Farm	Area under cultivation (ha.)	Annual essential oil production (MT)
Belbari farm Morang District	20	2
Lamahi farm - Dang district	5	0.5
Tamagadhi farm- Bara district	212	20
Tarahara farm - Sunsari District	50	5
Tikapur farm - Kailali district	10	1
Total	297	28.5

Source: Maharjan *et al.*, 2002.

Overall, it was realized that cultivation of *Mentha arvensis* and *Matricaria chamomilla* was increasing, as these crops were found more paying them than the rice crop. There was also good opportunity of alternative employment during slack period. Demand of seeds and seedlings of *Matricaria* and *Mentha* for cultivation is very high. It is mainly due to availability of processing facilities at HPPCL premises and buyback guarantee provided by HPPCL itself.

4.8.2 Department of Plant Resources (DPR)

There are seven District Plant Resources Offices (DPROs) and among them DPRO Dhanushadham, DPRO Hetauda, DPRO Banke, and DPRO Kailali are in Terai region. The main targets of these offices are germplasm conservation, research and development of cultivation technology of medicinal and aromatic plants (MAPs) and training on MAPs. The research work is confined on species like Amala, Kurilo, Pipla, Gurjo, Bel, Sikakai, and Kalmedh etc.

Similarly, Ambapur Medicinal Plant Nursery at Ambapur Dang district was established in 1997 with an area of 0.25 ha. The nursery is supporting local community and growers by providing seed and seedlings of NTFPs. Seedlings produced by the nursery are presented in Table 4.6.

Table 4.6 Seedlings availability at nursery during study period in 2002

Local Name	Botanical Name	Number of Plants/seedlings	Remarks
Amala	*Phyllanthus emblica*	20	In the field
Bakaino	*Melia azdarchta*	20	In the field
Barro	*Terminalia bellirica*	5	In the field
Dalchini	*Cinnamomum tamala*	20	In the filed
Dhupi	*Cupressus* sp.	100	In the field
Gudmar	*Gymnema sylvestre*	2	In the field
Gudmar	*Gymnema sylvestre*	5	In polybags
Kangiya	*Grevelia robusta*	25	In the field
Katahar	*Artocarpus heterophyllus*	55	In the field
Kurilo	*Asparagaus racemosus*	40	In the field
Neem	*Azdarachta indica*	350	In the field
Ritha	*Sapindus mukorosii*	4	In the field
Rudraksha	*Elaeocarpus sphaericus*	41	In the field
Sarpagandha	*Rauvolfia serpentina*	1580	In the field
Sissoo	*Dalbergia sissoo*	500	In the field
Srikhanda	*Santalum album*	20	In the field
Sugandhakokila	*Cinnamomum glaucescens*	6000	In polybags
Sugandhakokila	*Cinnamomum glaucescens*	8000	In the field
Taka	*Argemone mexicana*	25	In the field
Teak	*Tectona grandis*	5	In the field

Source: Field Study (2002)

4.9 Other Institutions Involved in NTFPs Farming

Mahendra Sanskrit University, Bijauri of Dang district in collaboration with Royal Nepal Academy of Science and Technology (RONAST) is undertaking the cultivation and management of some species of NTFPs. Details of the cultivated/planted species are presented below (Table 4.7):

Table 4.7 NTFP species planted by Mahendra Sanskrit University (by Year/area)

Local Name	Botanical Name	Planted year	Area/plants	Remarks
Amala	*Phyllanthus emblica*	1999	160 plants	Not yet fruiting
Asuro collected	*Justica adhatoda*	1999	800 plants	70 kg leaf
Aswagandha	*Withania somnifera*	1999	0.1 ha	7 kg. Root
Barro	*Terminalia bellirica*)	2001	5 plants	Growing well
Bijayasal	*Pterocarpus marsupium*	2001	10 plants	Growing well
Bojho	*Acorus calamus*	2001	16 plants	Growing well
Chyuri	*Aesandra butyracea*)	2000	35 plants	Growing well
Khamari	*Gmelina arborea*	2000	2 plants	Growing well
Koiralo	*Bauhinia* sp.	2001	3 plants	Growing well
Kurilo	*Asparagus* sp.	2001	10 plants	Growing well
Mel	*Pyrus pashia*	2000	1 plant	Growing well
Neem	*Azdarachta indica*	2000	4 plants	Growing well
Parijat	*Nyctanthes arbor-tristis*	2001	3 plants	Growing well
Pipla Golo	*Piper* sp.	1999	1000 plants	4 kg fruit collected
Pipla Lamcho	*Piper longum*	1999	1000 plants	4 kg fruit collected
Ritha	*Sapindus mukorossi*	2001	5 plants	Growing well
Rudraksha	*Elaeocarpus sphaericus*	1999	5 plants	Not growing
Sarpagandha	*Rauvolfia serpentina*	2000	700 plants	Growing well
Satisal	*Dalbergia latifolia*	2001	50 plants	Growing well
Srikhanda	*Santalum album*	2000	5 plants	Growing well
Sugandha kokila	*Cinnamomum glaucescens*	1999	250 plants	Growing well
Tatelo	*Oroxylum indicum*	2001	2 plants	Growing well

Source: Field Study (2002)

Note: Other NTFP/MAP species conserved included: Palash, Indrajau, Bhalayo, Gurjo, Rajbrikshaya, Sindure etc.

4.10 District Forest Offices

District Forest Offices are playing key role in the conservation and management of NTFPs under national forest systems. However, cultivation and management programmes for limited species of NTFPs are underway in donor-supported districts, particularly in Community Forestry. Major findings of in-*situ* conservation run by DFOs under their regular programmes are presented below:

DFO, Udayapur

Sapindus mukorrossi (Chiuri), *Cinnamomum tamala* (Tejpat), *Swertia chirayita* (Chiraito), *Asparagus racemosus* (Satabari), *Rubia manjith* (Majitho), *Allium* sp. (Ban lasun) *Thysanolaena maxima, Zanthoxylum armatum* (Timur), *Acacia rugata* (Sikakai), *Bombax ceiba* (Simal Khota), *Aegle marmelos* (Bel), *Shorea robusta* (Sal

dhup) and *Phyllanthus emblica* (Amala) are the major species under in-*situ* conservation in national forests of Udayapur district. DFO was also found to have issued the permit for the collection of most of the NTFPs mentioned above.

DFO, Dhankuta

Pinus roxburghii (Khote salla), *Acacia catechu* (Khayer), *Rubia manjith* (Majitho), *Swertia chirayita* (Chiraito), *Sapindus mukorrossi* (Ritha), *Amomum subulatum* (Alainchi), *Thysanolaena maxima* (Amriso) are the major species under in-*situ* conservation in national forest of Dhankuta district and the DFO has issued the permit for the collection.

DFO, Sunsari

Sapindus mukorrossi (Ritha), *Piper chaboo* (Pipla), Sita Phal, *Solanum surattense* (Kantakari phal), *Zanthoxulum armatum* (Timur), *Swertia chirayita* (Chiraito), *Asparagus racemosus* (Kurilo), *Tsuga* sp. (Thingure Salla ko pat), Kangio (*Grevelia* sp.), *Juniperus indica* (Dhupi), *Aconitum bisma* (Bikh jara), Mushrooms, *Rubia manjith* (Majitho), *Pinus roxburghii* (Lohan) are the major species under in-*situ* conservation in national forest of Sunsari district. The DFO has also issued the permit for their collection.

DFO, Siraha

Bauhinia vahlii (Bhorla Leaf), *Cinnamomum tamala* (Sinkauli/Dalchini)) and Bariyar are the major species under in-*situ* conservation in national forest of Siraha district and the DFO has issued the permit for their collection.

DFO, Sarlahi

Terminalia chebula *(Harro), Terminalia bellirica* (Barro), *Phyllanthus emblica* (Amla), *Asparagus racemosus* (Kurilo) are the major species under in-*situ* conservation in national forest of Sarlahi district and the DFO has issued the permit for their collection.

DFO, Saptari

Bauhinia vahlii (Bhorla Leaf), *Cinnamomum tamala* (Sinkauli), *Asparagus racemosus* (Kurilo), *Eulaliopsis binata* (Babiyo), *Bambusa* sp. (Bans) are the major species under in-*situ* conservation in national forest of Saptari district and the DFO has issued the permit for their collection.

DFO, Dhanusha

Acacia rugata (Sikakai), *Phyllanthus emblica* (Amla), *Bombax ceiba* (Simal), *Asparagus racemosus* (Kurilo), *Curculigo orchioides* (Musli), *Ephemerantha macraei* (Jibanti) are the major species under in-*situ* conservation in national forest of Dhanusha district and the DFO has issued the permit for their collection.

DFO, Mahottarai

Swertia chirayita (Chiraito), *Piper chaboo* (Pipla), *Terminalia chebula* (Harro), *Asparagus racemosus* (Kurilo), *Curculigo orchioides* (Musli), *Ephemerantha macraei* (Jibanti) are the major species under in-*situ* conservation in national forest of Mahottari district and the DFO has issued the permit for their collection.

DFO, Rautahat

Acacia rugata (Sikakai), *Bombax ceiba* (Simal), *Asparagus racemosus* (Kurilo), *Phyllanthus emblica* (Amla), *Ulmus wallichiana* (Pawan), *Boerhaavia diffusa* (Punarwa) are the major species under in-*situ* conservation in national forest of Rautahat district and the DFO has issued the permit for their collection.

DFO, Makawanpur

Swertia chirayita (Chiraito), Lichen, *Ephemerantha macraei* (Jiwanti), *Asparagus racemosus* (Kurilo), *Rubia manjith* (Majitho) and *Bombax ceiba* (Simal) are the major species under in-*situ* conservation in national forests. Similarly, Kurilo is the main species included in CFUG operational plan for in-*situ* and ex-*situ* conservation.

Roots of *Asparagus racemosus* (Kurilo jara), Lichen (Jhyau), *Ephemerantha macraei* (Jiwantii), *Berberis aristata* (Daru haldi), *Tanacetum dolichophyllum* (Bukephool), *Allium* sp. (Ban Lasun), *Swertia chirayita* (Chiraito), *Polypodium vulgare* (Bispage), *Rubia manjith* (Majitho), *Terminalia chebula* (Halik), *Discorea* sp. (Kukur Tarul), bark of *Bauhinia vahlii* (Bhorle bokra), *Sapindus mukorossi* (Ritha), *Phyllanthus emblica* (Amala), *Zanthoxylum armatum* (Timur), *Aconitum* sp (Bis), *Shorea robusta* (Saldhoop), *Podophyllum hexandrum* (Laghupatra), *Cinnamomum tamala* (Dalchini), bark of *Ulmus wallichiana* (Pawan Bokra), cone of *Pinus roxburghii* (Sal ko simta), *Abrus precatorius* (Tigedi), *Acacia rugata* (Sikakai), *Valeriana jatamasii* (Sugandhawal), *Taraxacum* sp. (Tukephool), *Terminali chebula* (Harro), *Terminalia bellirica* (Barro), *Taxus baccata* (Loothsalla), *Didymocarpus albicalyx* (Kumkum), *Juniperus* sp. (Dhoop), *Podophyllum hexandrum* (Laghupatra), cones of *Pinus wallichiana* (Gobresalla simta), Aakdakda, resin of *Pinus roxburghii* (Khoto), *Rheum australe* (Setakchini), Karatchulti, Masala, Tiarri are the major species for which, the DFO has issued the collection permits.

DFO, Bara

Asparagus racemosus (Kurilo), *Terminalia chebula* (Harro), Barro (*Terminalia bellirica*), *Acacia rugata* (Sikakai), *Acacia catechu* (Khayar), *Eulaliopsis binata* (Sabai grass), Pipla (*Piper longum*) and Simal (*Bombax ceiba*) are the major species under in-*situ* conservation in national forests. Similarly, Kurilo (*Asparagus racemosus*) and Pipla (*Piper longum*) are the major species included in CFUG operational plan for in-*situ* and ex-*situ* conservation. The DFO informed that one local NGO was promoted for cultivating NTFPs under developmental /biodiversity conservation Programme of DDC. In one VDC of the border area, a nursery of NTFPs was established by the

initiation of DFO. Amala (*Phyllanthus emblica*), Kurilo (*Asparagus racemosus*), Bhorla bokra (Bark of *Bauhinia vahlii*)), Leaf of *Bauhinia vahlii* (Bhorla Pat), *Eulaliopsis binata* (Babiyo), *Boerhaavia diffusa* (Punarnava), and *Ulmus wallichiana* (Pawan) are the major species DFO has issued the permit for their collection.

DFO, Parsa

There are limited forest areas in the district. Majority of forest area in the district is under protected area system. However, a private plantation programmes in 40 ha land is underway at Bageshoweri Titrawana. The farmers have been visiting the DFO for experts advise. It has clearly indicated that farmers are self-motivated and forest officials are supporting the NTFPs programmes.

DFO, Chitwan

Phyllanthus emblica (Amla), *Terminalia chebula* (Harro), *Terminalia bellirica* (Barro), *Asparagus racemosus* (Kurilo), Gurjoo (*Tinospora sinensis*), Jiwanti (*Ephemerantha macraei*), Sikakai (*Acacia rugata*), *Swertia chirayita* (Chiraito), *Rheum australe* (Setekchini), *Ulmus wallichiana* (Pawan bokra), *Sapindus mukorossi* (Ritha) are the major species under in-*situ* conservation in national forest of Chitwan district and the DFO has issued the permit for their collection.

DFO, Kapilbastu

Leaves of *Cinnamomum tamala* (Tejpat), *Asparagus racemosus* (Kurilo), *Piper longum* (Pipla), *Eulaliopsis binata* (Sabai grass) and *Sapindus mukorossi* (Ritha) are the major species under in-*situ* conservation in national forests. Similarly, *Asparagus racemosus* (Kurilo), *Piper longum* (Pipla) and *Cinnamomum glaucescens* (Sugandha kokila) are the major species included in CFUG operational plan for in-*situ* and ex-*situ* conservation. Rattan nursery establishment supports were provided to growers and a total of 700 saplings of rattan were distributed to the growers. Under soil conservation and bioengineering programmes in Kapilvastu, NTFPs distributed and planted are presented in Table 4.8.

Table 4.8 NTFPs seedlings distributed by Soil Conservation Programme in the fiscal year 2000/01 and 2001/02

S.N.	NTFPs	2000/01	2001/02	Total
1.	Amliso	36156	25656	61,781
2.	Bamboo	3381	4676	8,057
3.	Napier	46847	11718	58,592
4.	Rattan	1000	-	1,000
5.	Vetiver	15625	3906	19,531

DFO, Rupandehi

Bark of *Cinnamomum tamala* (Dalchini), *Mesua ferrea* (Bilaune), *Asparagus racemosus* (Kurilo), *Zanthoxylum armatum* (Timur), *Thysanolaena maxima* (Amriso), *Sapindus mukorossi* (Ritha), *Piper longum* (Pipla), *Swertia chirayita* (Chiraito) are the major species under in-*situ* conservation in national forest of Rupandehi district and the DFO has issued the permit for their collection.

DFO, Nawalparasi

Mesua ferrea (Belauni), *Cinnamomum tamala* (Dalchini), *Asparagus racemosus* (Kurilo/Satawari), *Sapindus mukorossi* (Ritha), *Acacia rugata* (Sikakai) are the major species under in-*situ* conservation in national forest of Nawalparasi district and the DFO has issued the permit for their collection.

DFO, Dang

Zanthoxylum armatum (Timur), *Cinnamomum glaucescens* (Sugandhakokila), *Sapindus mukorossi* (Ritha), roots of *Asparagus racemosus* (Kurilo jara), *Cinnamomum tamala* (Dalchini), *Rheum australe* (Amalbed), *Pistacia chenensis* (Kakadsingi), *Aconitum heterophyllum* (Atis), *Brachycorythis obcordata* (Salamdana), *Swertia chirayita* (Chiraito), *Asparagus filicinus* (Satabari), *Phyllanthus emblica* (Amala), *Brachycorythis* sp. (Kaladana), *Acorus calamus* (Bojho), *Fritillaria cirrhosa* (Kakoli jara), *Selinum tenuifolium* (Bhutkesh), *Rubia manjith* (Majitho), *Pinus roxburghii* (Lohan) are the major species under in-*situ* conservation in national forest of Dang district and the DFO has issued the permit for their collection.

DFO, Surkhet

Lichen (Jhyau), bark of *Valeriana jatamansii* (Sugandhawal jara), *Cinnamomum tamala* (Dalchini), roots of *Asparagus racemosus* (Kurilo jara), *Sapindus mukorossi* (Ritha), *Pinus roxburghii* (Lohan), leaves of *Cinnamomum tamala* (Tejpat), *Eucalyptus* sp. (Masalapat), Main, roots of *Acorus calamus* (Bojho jara), *Zanthoxylum armatum* (Timur), *Rheum australe* (Amalbed), *Swertia chirayita* (Chiraito), *Ephedra gerardiana* (Somlata), *Rheum australe* (Padamchal), and *Pistacia chinensis* (Kakadsingi phal) are the major species under *in-situ* conservation in national forest of Surkhet district and the DFO has issued the permit for their collection.

DFO, Kailali

Cone of *Pinus roxburghii* (Salla ko simta), *Sapindus mukorossi* (Ritha), bark of *Bauhinia vahlii* (Bhorla ko bokra,), *Curcuma aromatica* (Kachur jara), roots of *Asparagus filicinus* (Satawari jara), roots of *Asparagus racemosus* (Kurilo jara), Tejpat (leaves of *Cinnamomum tamala*), Dalchini (bark of *Cinnamomum tamala*), Daruhaldi (*Berberis aristata*), Amala (*Phyllanthus emblica*), Bojho (*Acorus calamus*), Pakhanbed jara (roots of *Bergenia ciliata*), Sikakai (*Acacia rugata*), and Harro

(*Terminalia chebula*) are the major species under in-*situ* conservation in national forest of Kalali district and the DFO has issued the permit for their collection.

DFO, Banke

Kurilo jara (roots of *Asparagus racemosus)*, Amriso (*Thysanolaena maxima*), Pipla (*Piper longum*), Amala (*Phyllanthus emblica*), *Asparagus racemosus* (Satawari), wild honey (Maha), *Acacia rugata* (Sikakai), and flower of *Madhuca longifolia* (Mahuwa) are the major species under in-*situ* conservation in national forest of Banke district and the DFO has issued the permit for their collection.

4.11 NTFP Collected based on DFO permits at regional level

Overall, the information derived from the DFOs on the collection permits issued and revenues received for the last three years indicted that status of NTFPs collections under national forests vary from east to west (see **Annex 9 and 10**). Types and quantity of NTFPs collected during the fiscal year (2001/02) from different regions of Nepa are given in the following Tables (4.9-4.12):

Table 4.9 Types of NTFPs and their quantities collected in the Eastern Region

S. No.	Local Name	Botanical Name	Quantity (Kg)
1.	Amala	***Phyllanthus emblica***	50
2.	Amliso	***Thysanolaena maxima***	1,650
3.	Babiyo	*Eulaliopsis binnata*	16,500 bundles
4.	Bael (Fruit)	*Aegle marmelos*	180
5.	Bamboo	*Bambusa/ Dendrocalamus sp.*	23,000 nos.
6.	Ban lasun	*Allium wallichii*	1,756
7.	Bikh Jara	*Aconitum spicatum*	425
8.	Chiraita	*Swertia chirayita*	10,636
9.	Dalchini	*Cinnmomum tamala*	29,490
10.	Dhupi	*Juniperus sp.*	700
11.	Kangio	*Grevelia sp.*	850
12.	Kanta Kari	*Solanum surattense*	5,500
13.	Khair wood	*Acacia catechu*	117,378
14.	Khoto (Pine Resin)	*Pinus roxburghii*	299,961.3
15.	Kurilo	*Asparagus racemosus*	5,406
16.	Lohan	*Pinus roxburghii*	200
17.	Majitho	*Rubia manjith*	11,136
18.	Mushroom	-	400
19.	Pipla Leaves	*Piper chava*	16,680
20.	Ritha	*Sapindus mukorossi*	108,310
21.	Sal Dhup	*Shorea robusta*	98
22.	Sikakai	*Acacia rugata*	500
23.	Simal Khoto (Resin)	*Bombax ceiba*	500
24.	Sitaphal	-	12,900
25.	Thingure sallla ko pat	*Tsuga sp.*	900
26.	Timur	*Zanthoxylum armatum*	3,280

Table 4.10 Types of NTFPs and their quantities collected in the Central Region

S. No.	Local Name	Botanical Name	Quantity (Kg)
1.	Amala	*Phyllanthus emblica*	3,928
2.	Babiyo	*Eulaliopsis binnata*	6,429,500
3.	Barro	*Terminalia bellirica*	3,523
4.	Bhorla leaf	*Bauhinia vahlii*	9,900
5.	Bhorle bokra	*Bauhinia vahlii*	5,000
6.	Bispage	*Polypodium vulgare*	700
7.	Bukephool	*Tanacetum dolichophyllum*	6,930
8.	Chiriato	*Swertia chirayita*	2,500
9.	Gurjoo	*Tinospora sinensis*	3,765
10.	Halik	*Terminalia chebula*	31,800
11.	Harro	*Terminalia chebula*	1,262
12.	Jhyau	*Parmelia* sp.	61,500
13.	Jiwanti	*Ephemerantha macraei*	23,680
14.	Khoto (Pine resin)	*Pinus roxburghii*	14,000
15.	Kurilo	*Asparagus racemosus*	141,826
16.	Louthsalla	*Taxus baccata*	500
17.	Majitha	*Rubia manjith*	31,800
18.	Musali	*Curculigo orchioides*	31,500
19.	Pawan	*Ulmus wallichiana*	8,900
20.	Pipala	*Piper longum*	400
21.	Punarwa	*Boerhaavia diffusa*	40,000
22.	Ritha	*Sapindus mukorossi*	1,700
23.	Saldhoop	*Shorea robusta*	240
24.	Setakchini	*Rheum australe*	900
25.	Sikakai	*Acacia rugata*	8,610
26.	Simal (Resin)	*Bombax ceiba*	3,928
27.	Tejpat	*Cinnamomum tamala*	2,517
28.	Tiarri	-	16,000
29.	Tigedi	*Abrus precatorius* Linn.	5,500

Table 4.11 Types of NTFPs and their quantities collected in the Western and Midwestern Region

S. No.	Local Name	Botanical Name	Quantity (Kg)
1.	Amala	*Phyllanthus emblica*	3,106
2.	Amalbed	*Rheum australe*	4,352
3.	Amliso	*Thysanolaena maxima*	1,000
4.	Atis	*Aconitum heterophyllum*	1,897
5.	Babio	*Eulaliopsis binnata*	1,384,900
6.	Belauni	*Mesua ferrea*	1,120
7.	Bhutkesh	*Selinum tenuifolium*	8,100
8.	Bisma	*Aconitum bisma*	19
9.	Bojho	*Acorus calamus*	370
10.	Chiraito	*Swertia chirayita*	3,92.5
11.	Dalchini Bark (Bokra)	*Cinnamomum tamala*	2,730
12.	Dalchini	*Cinnamomum tamala*	9,643
13.	Gujargano	*Cissampelos pareira*	30
14.	Jhyau	*Parmelia* sp.	12,100
15.	Kakadsingi	*Pistacia chinensis*	21,50.5
16.	Kakoli	*Fritillaria cirrhosa*	500
17.	Kaladana	*Brachyocorythis obcordata*	184
18.	Kurilo	*Asparagus racemosus*	22,400
19.	Kurilo	*Asparagus* sp.	74,283
20.	Lohan	*Pinus roxburghii*	2,660
21.	Mahuwa flower	*Madhuca longifolia*	98
22.	Main	-	200
23.	Majitho	*Rubia manjith*	60
24.	Padamchal	*Rheum australe*	225
25.	Pakhanbed	*Bergenia ciliata*	40
26.	Ritha	*Sapindus mukorossi*	81,325
27.	Rohini phal	*Mallotus philippensis*	1,100
28.	Salamdana	*Brachycorythis obcordata*	114
29.	Sikakai	*Acacia rugata*	30,155
30.	Somlata	*Ephedra gerardiana*	1,804
31.	Sugandhakokila	*Cinnamomum glaucescens*	793,688
32.	Sugandhawal	*Valeriana jatamansii*	4,700
33.	Tejpat	*Cinnamomum tamala*	1,305
34.	Tendu Leaf	*Disopyrus montana*	31,500
35.	Tigedi	*Abrus precatorius*	4,250
36.	Timur	*Zanthoxylum armatum*	183,367

Table 4.12 Types of NTFPs and their quantities collected in the Far Western Region

S. No.	Local Name	Botanical Name	Quantity (Kg)
1.	Amala	*Phyllanthus emblica*	1,495
2.	Bhorla ko bokra	*Bauhinia vahlii*	42,327.5
3.	Bojho	*Acorus calamus*	414.8
4.	Dalchini	*Cinnamomum tamala*	812
5.	Daruhaldi	*Berberis aristatica*	200
6.	Harro	*Terminalia chebula*	50
7.	Kachur jara	*Curucuma aromatica*	500
8.	Kurilo	*Asparagus racemosus*	3,330
9.	Pakhanbed jara	*Bergenia ciliata*	3,820.6
10.	Ritha	*Sapindus mukorossi*	23,235
11.	Salla ko simta	*Pinus roxburghii*	2,000
12.	Sikakai	*Acacia rugata*	113
13.	Tejpat	*Cinnamomum tamala*	43,61.5

The NTFPs species are placed in priority basis based on the amount harvested from the forest. Above Table (4.9) clearly indicates that Pine Resin, Khair wood, Ritha, Dalchini, Bamboo, Pipla leaves, Babiyo, Sitaphal, Majitho, Chiraito, Kurilo and Timur should be given priority to conservation as there is high demand of these species and still available in the natural forest of Eastern Region.

Similarly in the Central Region, priority NTFPs are Babiyo, Kurilo, Jhyau, Punarwa, Majitha, Halik, Musali, Jiwanti, Tairri, Khoto Pine resin, Bhorla leaf, Pawan, Bukephool, Sikakai, Tigeri, Bhorle bokra, Amala, Simta (Resin), Gurjoo, Barro, Tejpat, Chiriato, Ritha, Harro, Pipala, Setakchini, Bispage, Loothsalla, and Saldhoop for conservation and management.

Kurilo, Dalchini and Belauni are the priority NTFPs for promotion in Western Region.

Midwestern Region found very rich in NTFPs, including high value medicinal and aromatic plants. They include Babio, Sugandhakokila, Timur, Ritha, Kurilo, Tendu Leaf, Sikakai, Jhyau, Dalchini, Bhutkesh, Sugandhawal, Amalbed, Tigedi, Amala, Lohan, Kakadsingi, Atis, Rohini phal, Somlata, Tejpat, Amliso, Kakoli, Chiraito, Bojho, Main, Padamchal, Kaladana, Salamdana, Mahuwa Flower, Majitho, Pakhanbed, Bisma and, Gudargano. Similarly, in Far Western Region Bhorla bark, Ritha, Tejpat, Pakhanbed, Salla ko simta, Kurilo, Amala, Dalchini, Kachur, Bojho, Daruhaldi, and Harro have good markets, and thus need to promoted as priotiy species.

4.12 Value addition and processing industries

Many plant species have been lost and some are in danger of extinction as a result, leading to the challenges in bio-diversity conservation. It is observed everywhere that market economy is spreading and even at faster rate in the rural Nepal. In this context,

some NTFPs, including MAPs are cultivated for regeneration and value addition at local level to maximize benefits from minimum loss of natural resources. These are the approaches followed in Nepal for sustainable use of the resources.

Planned development intervention started since the inception of Master Plan for the Forestry Sector in 1988. This plan identified NTFPs development program as one of the six major development programs in the forestry sector that emphasized for promotion of value adding business in the country. The plan also consolidated forestry policy according to development endeavor. The Master Plan laid out the plan, policies and resource need for investments to develop the Forestry Sector for the period 1989-2010.

The plan cited as:

> "The establishment of a socially and economically viable and scientifically based development program on MAPs is essential to improve health care, the economy, and the quality of rural life in general." (Master Plan for the Forestry Sector, Nepal , 1988; Chapter 2, pp.7).

Similarly, the plan aims to contribute in the growth of local and national economies by managing the forest resources, developing the forest-based industries, and creating opportunities of employment for income generation. Similarly, Ninth and current (Tenth) Five-year Development Plans also have given priority to maximize the utilization of NTFPs for rural poverty reduction.

Earlier Forest Act and Regulations were more concerned in the control of harvesting and exportation of NTFPs from the forest. It seems to be overlooked in the sector of cultivation and value added NTFPs business. The Forest Act has since been amended and now "the Forest Act 1993" and "the Forest Regulations 1995" has been enforced. Apparently, Community Forest Users Groups (CFUGs) are also empowered by the act in exercising forest by laws and determine the level of punishment for violations within the community forests. According to the rule, it is necessary to get collection permit from the concerned District Forest Office (DFO) prior to collection of NTFPs. Subsequent, transfer and export permits are required to obtain from the DFO for the trade. The Ministry of Forests and Soil Conservation put forth bans on collection, use and sale of two species of herbs, namely, Panchaule (*Dactylorhiza hategeria*) and Yarchagumba (*Cordycep sinensis*). An additional ban was also imposed on raw material export of eight MAPs species since 1992/93.

The export-banned species are: (a) *Nardostachys grandiflora* (Jatamansi) (b) *Parmelia sp* (Jhyau) (c) *Valeriana jatamansi* (Sugandhwal) (d) *Cinnamomum glaucescens* (Sugandhkokila), (e) *Rauvolfia serpentina* (Sarpagandha) (f) *Taxus bacatta* (Louth salla) and (g) Asphalt (Shilajeet stone) (h) *Abies spectâbilis* (Talispatra). However, recent legal revision lifted ban on *Cordycep sinensis* and added *Picrorhiza scrophulariflora* on the ban list from the mid February 2001. It made Department of

Forest more responsible in allowing permits for processing and value-added production of these banned species.

Value addition refers to the adding up value to the existing value of the produce and services. It changes in the physical out look of the produce and services, which produce new look and new products with palatable look, are made. In Non-Timber Forest Products (NTFPs), unscrupulous values are added in every steps of trade.

Mostly, value addition is done on the following steps: a) post harvest practice, b) processing of NTFPs for producing intermediate products c) production of consumer goods. Post harvest technology involves three major tasks: a) cleaning/washing b) grading/ shorting c) packaging. During postharvest procesing in general 20 to 30 percent of value can be added in the original price of the NTFPs.

Processing technology surpasses through the available technology and method of processing to obtain different chemical substances from the NTFP. In this stage, the physical out-look is changed into the form of extract, oil and semi-solids. The stage of value addition is considered as the intermediary stage in between raw material and consumable product, where value addition ranges from 10 folds to 100 folds than the original cost of material (NTFPs). The final stage of value addition is to produce a product that can be made from the NTFPs. In this stage, several processing stages will be performed like formulations, mixing, compounding, packaging, etc. This stage produces consumable products ranging from therapeutic use to cosmetics and food. The value addition stage is seems to be most vital under Nepalese context.

Diadvantaged and poor people are collecting NTFPs for fulfilling their subsistence need. Sale of this natural resource has been supporting them with additional income. These primary collectors are selling NTFPs to the local dealers and hawkers. Finally majority of the product goes to Indian market in unprocessed form passing through several market chains.

Some of the multinational companies like, Dabur Nepal Pvt.Ltd., Nepal Liver Ltd. Balsara Herbals, Cosmos Herbal Pvt.Ltd are attracted in Nepal in utilizing NTFPs. These companies are producing intermediary to final consumer products ranging from health care products to soap, detergents and cosmetics. These companies are assisting country in export promotion and import substitution of finished products. As a result of this, the NTFPs dealers are benefiting more than before with the in-house market facility and competitive price. However, national industries are also initating in producing consumer products to maximize benefit nationally.

4.13 Processing Industries

The Bhrikuti Pulp and Paper Industry require thousands of metric tons of Sabai grass *(Eulaliopsis binata)* annually for high quality paper production. However due to open grazing system and lack of proper management of national forests availability of sabai grass is annually decreasing. Realizing the economic value of sabai grass, its

cultivation is underway by private initiation in a Magar village (18 Km away from Dang). On the other hand, due to lack of in-*situ* conservation in Bara and Parsa district, it is going to be extinct very soon. Adhabar, Amlekhgunj (near to bridge no. 1and 2) area, of Bara district and Chakari Makari area of Parsa district are presently known as source areas in Central Region. Demand and supply situation for year 2001 of Sabai grass by Bhrikuti Paper Industry is presented in Table 4.13.

Table 4.13 Annual quantity of Sabai grass harvested from natural forests in 2001 by Bhrikuti Paper Industry

S. N.	District	Collection targeted (Kg.)	Quantity harvested (Kg.)
1.	Arghakanchi and Kapilvastu	10,000	10,000
2.	Banke	12,200	11,000
3.	Bara/Parsa	1,500	1000
4.	Dang	15,000	14,000
	Total	38,700	36,000

The above table indicates that the industry is able to harvest the Sabai grass nearly as much as it targeteted to collect and use it as raw material. This also indicates the high potentiality of conservation (in-*situ* and ex-*situ*) of Sabai grass at these districts.

Key capacity requirements in this context include evolving methodologies for continuous assessment of local knowledge in NTFP propagation techniques and cultivation, assessing the feasibility of NTFP-based enterprises, sourcing finances for such initiatives, developing an understanding of organic certification, and other institutional issues related to NTFPs. In view of this there is a need for conceptual clarity and skill enhancement in the area of sustainable management, for which, skill training is needed relating to local uses, value addition and processing, cultivation, and trade of NTFPs.

Major aromatic oils produced under farmer's field conditions as well as HPPCL farm conditions from 1998 to 2001 are presented in Table 4.14.The processing industries supported by the HPPCL are presented in Table 4.15. Industrial utilization of MAPs has been made by the HPPCL at government level and about 30 industries at private level. Major industries are still at the secondary stage of value addition producing essential oils and extracts from the NTFPs. Some of the processing industries involved only MAPs business is presented in Table 4.16.

Table 4.14 Aromatic oils produced between 1998 to 2001 under farmers' field and HPPCL farm

Aromatic Plants	Year			
	1998	1999	2000	2001
Citronella	1100 kg	1600 kg	2250 kg	2500 kg
Matricaria	190 kg	180 kg	218 kg	264 kg
Mentha arvensis	800 kg	1600 kg	2200 kg	5300 kg
Palmarosa	-	300 kg	920 kg	1100 kg

Table 4.15 Processing Centers operating under the assistance of HPPCL

District	Aromatic Plants processed	Number of farmers involved
Dolakha	Wintergreen, Anthopogan and Juniper.	9
Humla	Jatamanshi	2
Jumla	Jatamanshi	3
Lalitpur	Kachur, Artimesia and Calmus	4
Ramechaap	Wintergreen, Anthopogan and Juniper.	5

Table 4.16: Major Industries involved in processing of MAPs only

Name of the industry	Types of raw material consumed	Final products	Status
Acme Rosin & Turpentine Co.	Pine trees	Rosin and Turpentine	Manufacturers and exporters.
Community based local processing units in Jumla, Dolpa, Dolakha and Lalitpur- 14 units.	Medicinal and aromatic plants	Massage	Practitioners
Cosmos Herbal Pvt. Ltd. Baluwatar, Kathmandu.	Medicinal and aromatic plants	Herbal medicines and cosmetics	Manufacturers and exporters.
Dabur Nepal Ltd., Tangal, Kathmandu	Medicinal and aromatic plants	Herbal medicines and cosmetics	Manufacturers and exporters.
Gorkha Ayurved Co., Chhetrapati, Kathmandu	Medicinal plants	Ayurvedic medicines	Manufacturers and exporters.
Herbs Production & Processing Co Ltd., Koteshore, Kathmandu	Medicinal and aromatic plants	Essential oils, herbal extracts, herbal care, rosin and turpentine oil.	Manufacturers domestic sellers, exporters.
Himalayan Zinger Factory, Tanahun.	Medicinal and aromatic plants.	Essential oils	Manufacturers and exporters.
Kunfen Aushadhalaya, Chhetrapati, Kathmandu.	Medicinal plants	Tibetan medicines	Manufacturers and practitioners.
Luxmi Rosin & Turpentine Pvt. Ltd., Nepalgunj.	Pine trees	Rosin and Turpentine	Manufacturers and exporters.
Natural Products Industries, Chanauta, Krishna Nagar.	Medicinal and aromatic plants.	Essential oils and extracts	Manufacturers and exporters.
Nepal Lever Ltd. Hetauda	Aromatic plants	Cosmetics	Manufacturers and exporters.
Nepal Rosin & Turpentine Co. Ltd. Dhangadhi, Nepal	Pine trees	Rosin and Turpentine oil	Manufacturers and exporters
Royal Drugs Ltd. Babar Mahal, Kathmandu.	Essential oils and medicinal extracts of medicinal and aromatic plants.	Allopathic medicines	Manufacturers and distributors.
Shree Krishna Aushadhalaya, Keltole, Kathmandu	Medicinal plants	Ayurvedic medicines	Manufacturers and sellers.
Singh Durbar Vaidyakhana, Singh Durbar, Kathmandu.	Medicinal plants	Ayurvedic medicines	Manufacturers and seller
Surya Rosin & Turpentine Co.	Pine trees	Rosin and Turpentine	Manufacturers and exporters.
Unani Aushadhalaya, Bagbazar, Kathmandu	Medicinal plants	Unani medicine	Manufacturers and practitioners.
Vaidyas, Dhamis and Jhankris	Medicinal and aromatic plants	Traditional ayurvedic preparation	Practitioners.

Source: Mahajan *et al.*, 2002.

Chapter 5

Role of NTFPs in National Economy, Rural livelihood and Biodiversity Conservation

5.1 Role of NTFPs in national economy

Non-Timber Forest Products (NTFPs) play an important part in the national economy of Nepal. In the past, they were neglected resources, despite their economic significances; export earning potentiality, importance to resource poor households and their role in maintaining biodiversity. Its role is particularly important for the countries like Nepal where the income opportunities are very limited for rural households. The Ninth and Tenth Five Year Plan has identified the NTFPs potential in Poverty reduction programmes. NTFPs can play an important role in enriching revenue sources for government itself. The expanding markets of NTFPs have brought new challenging opportunities for Nepal. On the one hand, there is a great export potential, on the other hand there is the issue of sustainability.

As the most NTFPs export from Nepal is not occurring through legal channels, the accurate estimate of its contribution to the national economy is difficult. The annual value of the NTFP trade at Indian border in 1994 was estimated to be US$ 8.2 million, which constitutes about 5% of the total contribution of the forestry sector (Edwards, 1996). According to Bhattarai and Olsen (2000), about 10-15 thousands tons of plant products of more than 100 species, valued at about 10 million US dollars, are collected in the wild from forest and other vegetation types, most of which are exported in crude form or after primary processing. However, about 20 high-demand and high value ones alone constitute about 80% of the volume and value trade. The Environment and forest Enterprise Activities (EFEA) project estimated that the market value of officially collected NTFPs from the 7 project districts is about US$ 4million. According to Kanel (2000) NTFPs valued US$ 18million at border price are annually exported to India.

The potential of NTFPs can be manifold of the present contribution to the national economy, provided the condition that sound actions and intervention aimed at increased domestication and cultivation on private farmlands, and in leasehold and community forests are taken. The trade in medicinal plants is an important source of revenue to the government and a major source of cash income to rural people. Regulatory policies related to harvesting/collection, transport and processing of NTFPs, and fiscal policies such as arbitrary royalty fixation, institutional bottlenecks and issues such as marketing and trade has restricted the growth of the NTFPs in Nepal (Kanel, 2000).

5.2 Role of NTFPs in rural livelihoods

In some rural areas of Nepal, the cash from the annual harvest of NTFP is the only income obtained from forestland and contributes more than half of the average

household annual income (Edwards, 1993). Their collections from wild, cultivation, transportation and sale have been generating steady income and employment opportunities in remote areas where majority of people including women are socially and economically disadvantaged. According to Olsen (1998), 470,000 households in Nepal are involved in collection of NTFPs for commercial purposes. There is an ever increasing demand for NTFP based herbal and wooded products in the developed nations of Europe, USA, Canada and Japan, and in countries like India and China. The increased demand for the NTFP based products and growing preference of organic/plants based medicine over antibiotics worldwide (but more in developed countries) have raised the potentiality of NTFP in rural development programmes.

The amount of processed NTFPs is quite high in comparison to raw and unprocessed NTFPs. However, most of the NTFPs are exported in the crude form. The income can be increased manifold for the stakeholders if the NTFPs can be sent after being processed in Nepal. The collectors are not getting the fair price in comparison to roadhead traders and stockists. Such marketing aspects limit the potentiality of NTFPs in sustaining rural livelihoods. Most of the NTFPs traded from Nepal at present is originated in the hills. The NTFPs species originated in the Terai from tropical forest has lower market prices. This limits its potential in income generating aspects. As the market is export oriented and the prices are fixed by NTFPs traders based in India, the scope for marketing is limited in the present context for the NTFPs of the Terai region (particularly for medicinal and aromatic plants). Besides, these many NTFP species even though not marketed, help local people in sustaining by supplementing the vital nutrients in diets of the people. They also provide fibres for making ropes.

During the present study, some medicinal and aromatic plants originated in the Terai (tropics/subtropics) such as *Asparagus racemosus* (Kurilo/Satawari), *Cinnamomun tamala* (Tejpat/Dalchini), *Terminalia chebula* (Harro), *Terminalia bellirica* (Barro), *Acacia rugata* (Sikakai), Piper chaba (Chabo), *Piper longum* (Pipla), *Elaeocarpus shaericus* (Rudraksha), *Phyllanthus emblica* (Amala), *Discorea deltoidea* (Bhyakur), *Curculigo orchiodes* (Musli), and *Epimerantha macraei* (Jiwanti) are identified as species with potential to generate income for local people. Similarly, fibre based NTFPs such as *Bambusa/Dendrocalamus* sp. (bamboos) and *Calamus* sp. (rattans) also have great potential to generate income for the rural people. However, lack of scientific knowledge on sustainable harvesting and management practices has resulted into reduced availability of these species in the forest. As most of these species are collected and generally not cultivated on private lands, it can be said that NTFPs potential is not fully explored to its potential. The situation calls for development of action plans on NTFPs and their implementation in the Terai region. The regulatory policies that influence the NTFPs development need to be revised and there is a need to be regulating on the NTFPs availability. The production forecast of NTFPs collected or cultivated also needs to be done in this context.

5.3 Biodiversity conservation initiatives

Nepal has become a party to several international agreements and conventions in order to fulfill its international obligations towards the conservation of rich biodiversity. Nepal is one of the signatories of the CITES (Convention on International Trade in Endangered Species of Wild Flora and Fauna) in 1972 (entry in 1993) and CBD (Convention on Biological Diversity), also known as the Rio Declaration in 1992 (entry in 1994) . Besides that it is also a signatory to Plant Genetic Resources Global Action Plan held at Leipzig, Germany. As a signatory to such international agreements, it is committed to the protection of environment and biodiversity through strategies and measures by an effective national plan.

Nepal does have a fairly extensive network of protected areas that covers about 18% of the total land area. There are 3 wildlife reserves and 2 national parks in the Terai region of Nepal. Even so, Nepal's natural resources are being exploited above their sustainable capacity (Yonzen, 1993; Subedi and Binayee, 1993). The Nepal's biodiversity faces pressures from variety of sources. At the local level, people continue to rely on the forest and pasture land for fuel, fodder, timber and variety of NTFPs. The subsistence demand for such products is increasing along with the sharp rise in population. This is particularly more evident in the Terai region where there is continuous flow of in-migration particularly from the hills. On the other hand, increased demand from the markets based in India and Overseas for NTFPs without an internal system of sustainable harvesting has induced a more serious threat for available NTFP resources in Nepal. Due to over-exploitation, some of the species such as *Dactylorhiza hatagirea* (Panchaule) has already bome endangered and government has put the ban on its collection. But its increased demand and high market value, however its illegal harvesting continues unabatedly.

This demand has resulted in illicit collection, over-exploitation of some species, compounded with poor harvesting practices have caused a decrease in the NTFPs resources in Nepal. Collectors of these products are generally the poorer sections of the society who lack other viable income sources, give less attention to uncontrolled collection. As demand from traders increases, so does the extraction of NTFPs and such action increases pressure on local biodiversity. During the present study, local people in Bara and Parsa districts informed about the decreased supply of NTFPs, especially *Asparagus racemosus* (Kurilo) outside the Protected Area system. Because a vast area of the Terai region is still outside the Protected Area system, community based participatory conservation approach is the only way to slow the rate of biodiversity loss. This also calls for certification on sustainable harvesting of NTFP resources in the Terai region of Nepal.

The situation calls for conservation initiatives (in-*situ* and ex-*situ* conservation) to stop further degradation of NTFP resources. The stakeholders who are involved in the forest management and utilization are the actors for any conservation on action. On the other side, the situation calls for initiatives aimed at promotion of NTFPs cultivation/domestication of high value NTFPs that can help sustain livelihoods and generate extra income for resource poor households. The technical know-how of

sustainable harvesting and management practices needs to be developed for NTFPs on species-wise basis.

5.4 Status and potential of NTFP species cultivated or conserved in the Terai and Inner-Terai region

Recently HPPCL, a governmental organization, and Dabur Nepal have initiated the cultivation of some important NTFPs. According to Bhattarai and Maharjan (2000), HPPCL has introduced farming, processing and sustainable collection practices for NTFPs on its own farms, private lands and community forests involving local communities. Sales rates for some NTFPs traded by HPPCL are presented in Table 5.1. Based on the table, it can be said that there is a scope for income generation through commercial cultivation of these species. According to HPPCL, the local people can easily enhance their income from the cultivation of these NTFP species. The cultivation techniques and management of these species are already known.

Sabai grass (*Eulaliopsis binata*) is used traditionally in rope making, papermaking and roof covering thatching. For paper making, Sabai grass is reputed to be superior to most other available grasses. Small paper mills have been operating since 1986 at different parts of Nepal. These paper mills have been designed to take Sabai grass and straw as raw material. These mills have a combined capacity of about 70 tonnes per day (Khatri 1994). Although the Indian paper industries have been using Nepal's Sabai grass for a long time. After the establishment of paper industries in Nepal the Indian industries have been discouraged from purchasing Nepalese sabai grass. Thus, there is now no significant export of Sabai grass (Khatri 1994).

Table 5.1 Sales rates for NTFPs traded by HPPCL (December 2000)

Botanical /English Name	*Local Name*	Price/kg (NRs)	US$
Acorus calamus	Calamus oil*	2,750	37.2
Artemisia vulgaris	Artemisia oil*	5,155	69.7
Cinnamomum glausecens	Sugandha kokila oil**	1,215	16.4
Curcuma zeodaria	Kachur oil*	3,480	47.0
Cymbopogon winterianus	Citronella oil**	400	5.41
Cympobogon	Lemongrass oil**	660	8.9
Cympobogon martini	Palmarosa oil**	895	12.1
Gaultheria fragarantissima	Gultheria oil**	1,050	14.2
Juniperous recurva	Juniperberry oil*	6,500	87.8
Lichen resinoids	Jhayau*	1,160	15.7
Matricaria chamomilla	Camomile oil*	12,600	170.3
Mentha arvenis	Japnees mint oil**	710	9.6
Nardostachys grandiflora	Jatamansi oil*	8,900	120.3
Ocimum basilicum	French basil oil*	3,798	51.3
Rhododendron anthopogan	Anthopogan oil*	5,280	71.4
Rosin	Rosin	49.20	0.7
Shilajit processed	Asphalt	1,100	14.9
Turpentine	Turpentine	35	0.5
Zanthoxylum armatum	Timur oil*	4,255	57.5

Source: HPPCL (2003), Price as of April 2003, *Price based on shipment of minimum 10kg, US$ 1=NRs 74

**: Price based on shipment of minimum 50 kg

Bamboos occur both in natural forests and private farmlands, in the Terai and Midhills of Nepal. Bamboo is economically important both for rural and urban people as a construction material. Bamboo culms and the products made from them have good markets both within the country and overseas. Bamboo craftmaking is a source of income for many rural people that include women, and socially and economically disadvantaged groups (Das, 2002). Karki and Karki (1997) have listed 15 types of major bamboo species and their traditional uses. The largest diameter bamboo in Nepal falls in the genera *Bambusa* and *Dendrocalamus*. The smaller bamboo generally falls in the genera *Drepanostachyum/ Thamnocalamus*.

Bamboo and cane are extensively used to make traditional baskets, mats and furniture, and for building material in rural areas. The habitats of commercially exploitable bamboo and cane have been reduced to the brink of disappearance (Khatri, 1994). At present there is no significant export of bamboo from Nepal.

Recent studies by Amatya (1997) and Amatya et *al.* (1998) showed three types of rattan (*Calamus tenuis, Calamus leptospadix* and *Calamus acanthospathus*) found in Nepal. Among them *Calamus tenuis* is used most widely and economically it is the most important. Rattan is used mainly in furniture. There are a few cottage industries that utilize rattan. The monthly turnover of these industries ranges from US$35 to US$107.

Other important fibres used in paper and rope making include *Girardinia diversifolia*, *Edgeworthia gardeneri*, *E. papyrifera* and *Agave* sp.

Nepalese essential oils have been well received in the regional and European markets. The conventional oils such as palmarosa, citronella, lemon grass and tagetes have a growing demand from foreign customers. The case is similar with certain newly introduced unconventional items such as *Rhododendron anthopogon* oil. *Nardostachys grandiflora* (Jatamansi oil) and *Zanthoxylum armatum* (Timur) oil require greater efforts for successful export. The future of the essential oil industry looks promising; with foreign firms entering Nepal for the manufacture of soaps and detergents (Rawal, 1995). It has been estimated that about 39 300 kg of dried jatamansi *(Nardostachys grandiflora)* were marketed whereas its production potential could be more than 100,000 kg (New Era 2001).

Indian traders have estimated that 90 percent of the *Nardostachys grandiflora* (jatamansi) drug in the Indian market originates from Nepal.

5.5 Quantity of NTFPs traded: an indicator of the in-*situ* and ex-*situ* conservation status of species

Level of trade of particular species in particular area is an indicator of their in-*situ* and ex-*situ* conservation status in that area. The quantity/volume NTFP traded over a period of years also help to estimate the quantity of the NTFPs available for ex-*situ*

and in-*situ* conservation, and their sustainable harvest, provided that the information collected is based on sound research methodology. The quantity of NTFPs being traded, also provide the information on which species have high market demand. Such information also helps to determine which species may need conservation action. The types of NTFP species traded and their quantities and the market centres in various surveyed districts are given in **Annex 11.1-11.10.**

Traders can play a vital role in the promotion, conservation and cultivation of NTFP species. It was found that in recent years, some traders are providing training to collectors on sustainable harvesting methods of NTFPs like *Parmelia* sp. (Jhyau), *Asparagus racemosus* (Satawari), *Cinnamomum tamala* (Dalchini) and other seed setting species. Combined information on marketing and trading may help to correlate the status but it may not be enough to explain the scenario. It needs a detailed study. With a view to identify and prioritise high value NTFPs for conservation, management and market promotion, a summary of most commonly collected and traded NTFPs from 16 market outlets, from east to the west Nepal is presented below (Table 5.2). It is evident from the study (see Annex 10.1-10.10) that some of the NTFPs such as Alainchi (Cardamom), *Elaeocarpus* sp. (Rudrakshya) and *Rubia manjith* (Majhitho) are concentrated in the east and others like *Cinnamomum tamala* (Dalchini), *Acorus calamus* (Bojho), *Zanthoxylm armatum* (Timur) and *Bergenia ciliata* (Pakhanbed) are concentrated in the west. It is important to note that species such as *Cinamomum tamala* (Tejpat), *Sapindus mukorossi* (Ritha), *Asparagus* sp. (Kurilo) and *Swertia Chirayita* (Chiraito) are distributed from east to the western Nepal (see details in Annex 10.1-10.10).

Beginning from the Farwest region (Seti and Mahakali zones), the trade center and traders of Attaria, Kailali indicates that trade of leaves of *Cinnamomum tamala* (Tejpat) was highest (18,000 kg) followed by *Ephedra gerardina* (Samayo) (8,500kg), *Sapindus mukorossi* (Ritha) (8500kg), bark of *Cinnamomum tamala* (Dalchini) (8000 kg), *Acorus calamus* (Bojho) (5,000kg), *Berberis aristata* (Chutro) (2000kg), and *Bergenia ciliata* (Pakahanbed) (2,000kg) during the last Fiscal Year (2001/02). These NTFPs were collected from Achham, Bajhang, Baitadi and Dadeldhura districts. Other NTFPs, like bamboo and rattan were traded but not recorded in the list. Therefore, these NTFPs must be focused under cultivation, conservation (*in-situ* and *ex-situ)* and management in tropical region of the Far Western Nepal.

Table 5.2 Most traded NTFPs from the Tropical Regions of Nepal

S.N.	Nepali trade name	Botanical name of plants	Parts used	Quantity (Kg)	Quantity traded order
1.	Amala	*Phyllanthus emblica*	Fruit	36,500	10
2.	Barro	*Terminalia bellirica*	Fruit	13,500	14
3.	Bhorla ko Bokra	*Bauhinia vahlii*	Bark	27,500	11
4.	Bilaune	*Musea ferrea*	Bark	700	17
5.	Bojho	*Acorus calamus*	Rhizome	23,000	12
6.	A. Dalchini	*Cinnamomum tamala*	Bark	98,000	6
	B. Tejpat/Masalapat	*Cinnamomum tamala*	Leaf	292,000	3
7.	Harro	*Terminalia chebula*	Fruit	9,000	15
8.	Jiwanti	*Ephemerantha macraei*	Pseudo-stem	21,500	13
9.	Jhyau/Budhani	*Parmelia* sp.	Thallus	443,000	2
10.	Kurilo/Satawari	*Asparagus racemosus*	Root	189,200	4
11.	Musli	*Curuculigo orchioides*	Root	5,030	16
12.	Pakhanbed	*Bergenia ciliata*	Root	57,000	8
13.	Pipla	*Piper longum*	Fruit	41,150	9
14.	Ritha	*Sapindus mukorossi*	Fruit	857,800	1
15.	Sikakai	*Acacia rugata*	Fruit	139,500	5
16.	Simal Khoto	*Bombax ceiba*	Sap	1,400	18
17.	Sugandhakokila	*Cinnamomum glaucescens*	Fruit	75,400	7
			Total	**2,331,180**	

Source: Field study, 2002.

Similarly, trade data for the same period from Midwestern region indicates that *Zanthoxylum armatum* (Timur) (443,000kg), followed by *Sapindus mukorossi* (Ritha) (437,000kg), *Lichen sp.* (Budhani) (400,000kg), *Nardostachys grandiflora* (Jatamansi) (200,000 kg), *Asparagus racemosus* (Kurilo) (123,000 kg), and *Cinnamomum tamala* (Tejpat) (122,000 kg) are among the highest traded species. The trade data also indicated that *Zanthoxylum armatum* (Timur), *Sapindus mukorossi* (Ritha), *Asparagus racemosus* (Kurilo), *Cinnamomum tamala* (Tejpat), *Valeriana jatamansii* (Sugandhawal), *Acacia rugata* (Sikakai), *Cinnamomun glaucescens* (Sugandhakokila) and *Piper longum* (Pipla) and *Phyllanthus emblica* (Amala) were among the potential NTFPs for future consideration.

In the Western region, limited number of species such as *Cinnamomum tamala* (Dalchini) (9,000 kg), *Asparagus racemosus* (Kurilo) (3000 kg), *Zanthoxylum*

armatum (Timur) (24,000 kg) and bark of *Mesua ferrea* (Bilauni) (70 kg) were reported traded during the same fiscal year 2001/02. As compared to other regions this region seems to have low volume of NTFP trade.

Furthermore, trade data of Central Region indicates that NTFPs such as *Parmelia* sp. (Jhyau) (60,000 kg), *Acacia rugata* (Sikakai) (50,100 kg), *Curculigo orchioides* (Musli) (40,000 kg), *Asparagus racemosus* (Kurilo) (39,550 kg), *Rubia manjith* (Majitho) (33,000 kg), and *Phyllanthus emblica* (Amala) (20,800 kg) are most heavily traded. Among other species close to the same volume of trading included *Sapindus mukorossi* (Ritha), *Cinnamomum tamala* (Tejpat), *Ephemerantha macraei* (Jiwanti), *Swertia Chirayita* (Chiraito), and *Ulmus wallichiana* (Pawan). This figure indicates that the Central Region has potential for cultivation and conservation of *Acacia rugata* (Sikakai), *Curculigo orchioides* (Musli), *Asparagus racemosus* (Kurilo), *Phyllanthus emblica* (Amala), *Sapindus mukorossi* (Ritha), and *Cinnamomum tamala* (Tejpat),. However, *Bambusa/Dendrocalamus* sp. (Bamboo), *Calamus* sp. (Rattan), *Piper longum* (Pipla) and *Eulaliopsis binata* (Sabai grass) were not included in the trade figures as yet, although these NTFPs are equally potential for industrial uses within the country.

Similarly, NTFP trade figure from the Eastern Region, during the fiscal year 2000/01 indicates that Large Cardamom (299 ton), Kurilo (14 ton), Tejpat (895 ton), Rudraksha (*Elaeocarpus sphaericus*) (48 ton), Pangra (*Entada phaseoloides*) (2 ton), *Trichosanthes tricuspidata* (Inderani seeds) (2 ton), Laha (*Laccifer lacca*) (55 ton), *Piper longum* (Pipla) (14 ton), *Rubia manjith* (Majitho) (85 ton), *Sapindus mukorossi* (Ritha) (191 ton), and *Swertia chirayita* (Chiraito) (364 ton) were among the largely traded species. However, other species such as *Thysanolaena maxima* (Amliso) and bamboo were not included in the trade. Amliso is increasingly considered as agricultural crop by many, so it is not included in the trade data. Bamboo required for scaffolding for Kathmandu and Bhutanese refugee camps in Jhapa and Morang are supplied from this region. According to Das (2002), altogether 340,000 bamboo culms are sold every year in market centres of Koshi Zone in eastern Nepal, almost all of which is cultivated on private farmlands. Bamboo is also harvested from the Chure forest of the Terai all over Nepal, but their quantity is negligible.

Chapter 6

Gross Margin Analysis

6.1 Gross Margin Analysis: A tool for managerial decision-making for cultivation

Transition to the market economy imposes heavier demands on management of NTFPs enterprise. Cultivation management decisions should be based on a sound economic analysis and effective methods of forecasting enterprise operation. The lack of effective technique for analyzing and forecasting business activities due to non-availability of an economist at NTFPs enterprise, substantially hampers rational managerial decision-making. The study team feels that to be a successful enterprise, one has to do a lot of homework and should have the skills to analyze and forecast their profitability. The research, experience and available information, and study team's experience gained during their involvement in reforming the NTFP sector, has helped them to expose the shortcomings of traditional approach to analysis and planning of NTFPs production under the market economy.

6.2 Lack of clear-cut separation between fixed and variable cost and its effect

The economic analysis such as break-even point, the simple and expanded reproduction points, and the optimal point are key indicators for forecasting profitability/viability of an enterprise. The lack of clear-cut separation of fixed and variable costs hampers finding these key points, which is essential for assessing the economic efficiency of the sectors in an enterprise. The consequences are that it delays acceptance of well-founded managerial directives.

The inconsistency in measurements ("outside" produce at purchase or selling price, "internal" – at production cost) during market assessment, measurement of production efficiency by sectors, lack of proper estimates of economic performance in a sector due to funds' redistribution between sectors, poor inventory accounting of internal produce (e.g. seed, breeds, etc.), unavailability of market assessment (often incorrect in practice) redistribution of fixed costs within the sectors (for example, of depreciation, economic and operational costs), Lack of propagation material costs in computing a sector (e.g, costs of seeds/ sapling multiplication), have a direct influence on the performance of an enterprise.

The experience of the study team has proved that the gross margin principle is effective in application to analysis and forecasting of NTFPs farms' economic activities. However, in practice the performance of existing NTFPs enterprises does not always supply expected results. Thus, the following aspects determine use of the gross margin calculating technique and its adaptation:

The techniques of analysis and forecast used require adaptation for use in NTFPs enterprises of various sizes, types and patterns of ownership (due to the lack of a healthy market on various kinds of produce and services). The Gross Margin

calculation technique is widely used by many HPPCL farms for preparing recommendations on developing production in farms. Existing practice of use of the Gross Margin technique is making express-analysis, simple use and presentation of calculation, assessment of market effectiveness of the sectors of an enterprise, receiving structured data for making cultivation management decisions, designing operational structure with consideration of cash flows.

6.3 Calculation of gross margin

While using the calculation technique, one usually calls it the Gross Margin method. When going into details, the terms and indicators are given with their specifications. The formula used in calculating gross margin is given below:

Gross Margin = (Market Value of Produce – Variable Costs)

The formula, considered, the whole production of a sector falls under estimation (including, for example, harvested yields in NTFP cultivation). Consequently, the minus in the formula is the gross value of produce assessed at market prices. It means the deduction in the formula (variable costs), as shown further when considering the kinds of costs, does not fully explain the essence of these costs. Calculation of gross margin (on the given technique) was made by considering of all, demands consideration of so-called direct variable costs that under certain circumstances change into conditionally variable costs.

6.4 Results identified by the gross margin analysis

Gross margin analysis of some of the prominent NTFPs are summarised below (Table 6.1) and the details are annexed (**Annex 12**). Based on available information, the annual per hectare returns from the aromatic perennial grasses like Palmarosa, Lemongrass, and Citronella, is NRs 17,945, NRs17,113, and NRs16,775 respectively. Similarly, seasonal per hectare returns from the seasonal crops like Chamomile, Mentha, and French basil is NRs. 20,830, NRs26,600 and NRs14,060 respectively. Cost benefit analysis per hectare of biannual crop like *Asparagus racemosus* (Satawari) is NRs 340,400 (Annex 12.7). Similarly, Cost benefit analysis per hectare of perennial trees like *Phyllanthus emblica* (Amala) *Sapindus mukorossi* (Ritha) *Cinnamomum tamala* (Tejpat) is NRs 65,500; NRs 81,900 and NRs 114,700 respectively (Annex 12.8-12.10).

Table 6.1 Gross margin analysis of major NTFPs

Species	Total production cost/ ha (NRs) for 4 yrs.	Gross profit in 4 year	Average profit/ year/ha (NRs)	Net profit/ha/ season
Chamomile	15,170/season			20,830
Citronella	52900	67,100	16,775	
French Basil	15,940/season			14,060
Japanese mint	23,400/2cutting			26,600
Lemon grass	57550	68,450	17,113	
Palmarosa	53,220	71,780	17,945	
Satawari/Kurilo	34,600/2yrs			340400/2yrs

Source: Bhattari DR 2001, HPPCL 2002, Parajuli DP 2001 (b).

The study (Table 6.1) shows that the above mentioned species can be successfully cultivated and can generate significant income for the cultivators. The NTFPs cultivators such as Community Forestry User Groups, Leasehold Forestry Groups and progressive farmers can use such tools for forecasting their profitability. However, they need to define the fixed and variable costs.

According to Das (2002), significant profit can be generated from the bamboo cultivation in farmlands and community forests. The bamboo farming can generate an annual income of Rs 200,000-500,000 per hectare once the clumps are well established. It takes 7 years to establish bamboos. After that, it provides bamboos annually without any management cost as experienced in eastern Nepal, where traders themselves bear the cost of bamboo harvesting. Similarly, a significant amount of profitability can be obtained from cane cultivation, but it needs careful margin analysis to make accurate forecasts.

The study does not cover the Gross Margin Analysis of each and every important, priority NTFP species of the Terai region due to lack of information. The research on cultivation and management is required for all the NTFPs in the Terai region. The profitability of cultivation should be analysed before promoting any NTFP species for domestication and conservation purposes. Cultivation techniques for some important NTFP species in the Terai region are given in **Annex 13**.

Chapter 7

Conclusions and Recommendations

7.1 The context

7.1.1 Increased attention to NTFP resources

The increased attention paid to NTFP in recent times stems from a number of factors. One such factor is the heightened interest in the value of bio-diversity, carbon sequestration and other environmental functions provided by the forests, and tropical forests in particular. There is a growing concern against the destructive use of the forests. A perception that NTFP management in the forest is more compatible with sustainable use of tropical forests than management for timber has been one of the more powerful influencing factors in raising interest in NTFP.

7.1.2 NTFP resources: Important to rural livelihood systems

A second factor is the growth in awareness that the use or sale of NTFP form important part of the livelihood systems of very large number of people who are living near and outside the national forests of the tropics/subtropics (Terai and Inner Terai region). It has given rise to the assumption that conservation and sustainable management of the NTFP resources have valuable welfare consequences as well as being environmentally sound. This encourages the idea that environmental and developmental goals (that includes poverty reduction) can be jointly pursued.

7.1.3 NTFP resources: Potential for commercial and industrial development

The demand and supply trends, issuance of collection permits and government royalty collection from NTFPs shows that there is a growing demand for many non-timber outputs such as oils, resins, pharmaceutical extracts, bamboos and rattans etc. There is also an increased realization that there are other species and products that may be of significant industrial value, considering the rich and diverse genetic resource in the Terai forests. Commercial arguments have therefore been advanced to reinforce the environmental and welfare arguments in favour of conservation.

7.1.4 Conflicts may arise

It can be argued in the context of above statement that different interests in NTFP do coincide to some level. However, they also contain inherent contradictions. Even though there may not be any (but it exists in Nepal), there are likely to be conflicts between conservation and development. For instance, most harvesting of forest products involves some damage and disturbance to ecological structure of forests and hence affects forest bio-diversity. Some highly sought species may not be able to withstand pressures, causing drastic reduction in their population or even local extinction. On the other hand, limiting the NTFP harvest to low intensity may have

adverse impact on the livelihood systems of the stakeholders (collectors, traders and middlemen), and may be the potential for conflict between conservation and development lobbies. The subject of management of the tropical forests of the Terai and Inner-Terai is thus a complex one and is characterized by multiple objectives, multiple products and multiple users. The equally complex patterns of use and change created by human demands and suggested interventions may complicate the matters.

7.2 Discussions of main findings and conclusions

7.2.1 Institutional role in NTFP research and development

The organizational analysis shows that there are many organizations involved in the development of NTFPs. However, the mechanism of working together for NTFP development in the Terai region is lacking at the moment.

It is in this context that solid research backing based on trials over period of time is required for the development of NTFPs in the Tropical forests of the Terai and inner Terai. The quantitative resource assessment of the available NTFP resources through inventory and taxonomic identification of all the plants and their chemical and nutrient analysis is necessary. Similarly, ex- *situ* and in- *situ* conservation efforts may be required. There is also a need to fill the information gap on propagation of many NTFP species found in the forests. Besides, the DOF lacks information on the sustainable harvest and suitable management techniques. The domestication programmes of the valuable NTFP species will not be very successful unless these steps are taken. The government research institutions like DPR and DFRS may play a lead role and may need to work in partnership with NGOs/INGOs involved in the NTFPs. However, both these organizations lack the necessary financial resources for conducting the research.

7.2.2 DOF's role in promotion of NTFP cultivation and management

NTFPs require special management and monitoring considerations in order to ensure the long-term sustainability of species and to minimize adverse social and ecological impacts. The operational forest management plans (OFMP) for each Terai and Inner Terai district are not up to date, and therefore needs to be revised or newly prepared. The plan should also identify and provide specific guidelines for each NTFP species or group of species that are considered for commercial harvest. The harvesting of NTFPs usually has lower impacts on the forest ecosystem compared to conventional timber harvesting. It can provide an array of social and economic benefits, particularly to community operations. The regular monitoring of NTFP resources may be needed for permitting the sustainable harvest of NTFPs from the forest. Besides that, the DOF needs to be involved in promoting the cultivation of NTFP in the private farmlands. The effective extension programmes may be needed for this purpose.

It is learnt from the present study that the NTFP management systems should address the ecological processes of forests and implement activities to minimize the ecological impacts on various types of NTFPs. Monitoring of NTFP population includes assessment of the regenerative capabilities of each NTFP. Where it is relevant, minimum viable populations of NTFP species are determined. Forest Officials collaborate with adjacent landowners and land managers to establish wildlife corridors, to conserve critical habitats, and to achieve other biological conservation goals as appropriate. In this regards the management plan should address the social and economic impacts of NTFP management, including utilization and traditional harvesting practices, and respect the cultural and religious significance of NTFPs to local and indigenous communities.

NTFP harvesting methods and levels must be appropriate to the species or species group, and reflect associated scientific, local, and indigenous knowledge.

7.2.3 Indigenous communities should receive fair and equitable share

Indigenous and local communities should receive fair and equitable share of the benefits arising from the use of any parts of the biological resources including their name or image during the process of marketing of NTFPs. Whenever local or indigenous knowledge is the basis for an NTFP related patent or registration, the source community should receive fair and equitable benefits.

Forest Offices give license for products like resins and barks to various collectors/companies from several patches of national forests. Problems and confusions occur when a piece of national forest with NTFPs licensed to companies is handed over to FUGs. Contradictions in this regard have been experienced in the case of resin and paper in Dadeldhura and Baglung districts respectively. Private collector parties are given exclusive collection rights on top of FUGs, which reduces the options for the FUGs and their ability to effectively manage the resource base.

7.2.4 Unhealthy business practices, illegal trade and legal provisions

NTFP regulations in Nepal are focused on wild collection, processing, use, trade and marketing. However, these provisions have not been adequately enforced. The success in NTFP domestication and cultivation is limited due to lack of appropriate technologies, trained manpower and poor implementation capacity of government organizations. Many banned and restricted species are being illegally traded with increased distortions, and their conservation status is questionable. The HMGN has banned some species of NTFPs for collection, while others are banned for export in crude form (HMG, 1995). The ban was imposed to conserve these species from extreme pressure and the threat of extinction. However, such ban has not been able to enhance conservation. Rather illegal trade and smuggling is going on through various ways.

This unhealthy business practices have created unfavourable conditions for the conservation of such endangered /valuable species. The illegal trading results in increased handling cost to traders, and this in fact has reduced the prices that collectors receive from the traders. Likewise, out of the eight species currently banned for exports in their crude form, four species viz. *Nardostachys grandiflora* (Jatamansi), *Valeriana jatamansi* (Sugandhawal), *Parmelia* sp (Jhyau), and *Cinamomum glaucescens* (Sugandhkokila) were found actually traded. In particular, Jatamansi and Sugandhawal are traded to India each year in significant quantities without processing (CBED, 1999). This is particularly due to lack of availability of such processing units in Nepal. The other problem is that definition of processing is not clearly defined and even the trivial changes in appearance are justified as having been processed for export purposes. The trade in reality of both the banned as well as restricted NTFPs is continuing with increased distortions in legal provisions, resulting in decreased benefits at the local level. Only a few influential traders/contractors are benefited out of such provisions.

7.2.5 Issues related to commercial cultivation of NTFP species on private land

Commercial cultivation of NTFPs in a private land is considered to be a difficult task. The entrepreneurs and traders are not adequately encouraged for growing and marketing of forest products from privately controlled lands. To some extent, this is simplified in particular species and particular locations where there is a vested interest of particular companies like Dabur Nepal. Complex formalities and procedures for transport and trade of NTFPs from private land, and conditions for district level supply before trading outside in case of NTFPs from community forests, are not conducive to sustainable NTFPs management and utilization.

Some of the contract growers are given enough freedom with regard to particular NTFPs use and transport by the existing Forest Acts and Regulations. In practice the smallholder and/or private NTFP growers have to suffer from difficult and lengthy formalities in relation to transport as well as sale. The export formalities are controlled by a number of government and non-government organizations (product certification by Department of Plant Resources, certificate of origin by Federation of Nepalese Chambers and Commerce, income tax certificate by department of VAT, and so on and so forth), and the entrepreneurs are severely discouraged to undertake export business in the NTFPs sector. In order to free the traders from all these hassles, NTFPs should be allowed for free trade as per the owner's will.

7.2.6 Involvement of NGOs/INGOs and industrial sectors in NTFPs cultivation and management

The Herbs Production and Processing Co. Ltd (HPPCL), a government undertaking under the MFSC is working with a vision of commercialization and industrial development of medicinal and aromatic plants (MAPs) sub-sector. The organization emphasizes local participation in sustainable collection, cultivation, processing and marketing of MAPs.

Similarly, Dabur-Nepal, a multi-location, multi-product enterprise for the herbal and Ayurvedic preparations, has started research and development projects on medicinal and aromatic plants in Nepal. It applies modern propagation techniques for medicinal and aromatic plants and encourages farmers to grow NTFPs with a buy back guarantee.

Similarly, some of the donor organisations have recently started the promotion of NTFPs in the Terai region; prominent among them are BISEP-ST (Netherlands funded) and LFP, Terai (UK funded).

7.2.7 Policy issues related with NTFPs promotion in Community Forests

So far, there is no legal limit in area of forest to be handed over and introduction of NTFP species in community forests (CFs) is mandatory. The operational plans of CFs lack provisions of NTFP management, and in general has put emphasis on management of CFs for timber, firewood and fodder. No specific guidelines are given for the development and management of NTFPs in the outline of operational plan stated in the current forestry regulations. The scope and opportunities for NTFP management within community forests could be widened if some specific provisions are included in the Forest Regulations. The main issue here is not trade and commercialisation, but whether or not the NTFPs are being extracted on a sustainable basis. The CFUGs need technical support to prepare sound operational plans that estimate the stock of resources and devise sustainable harvest levels and control mechanism. The current knowledge on sustainable management techniques of NTFPs is limited, and this implies the need for collaborative action and research on NTFPs.

However, provided there is a good market price for certain NTFPs, the CFUGs will initiate the cultivation and conservation of NTFPs in their community forests, and even their members will introduce them on their private farmlands. Some CFUGs in the Terai of Midwestern and Farwestern region have started conservation and sustainable management practices of the rattans, which have become one of the major sources of income for these CFUGs. Some CFUGs of Mid Western and Central Region have introduced or conserved Sabai grass (both *in-situ* and ex-*situ)* once they learnt that there is market for it. Due to similar reasons, some CFUGs of Central Region are involved in bamboo planting and in- and ex- *situ* conservation of Kurilo (*Asparagus racemosus*).

7.2.8 Issues related to value addition to NTFPs at local level

It is obvious that value added products of NTFPs are beneficial to local communities. However, several factors such as water, transport network, communication, power, energy and availability of markets depend on their capacity to add value and market them through carefully planned enterprises. Experiences in Nepal and elsewhere have shown that supporting communities in marketing of bio-resources reinforce incentives to conserve biological diversity (Subedi and Bhattarai, 1998, Salafsky *et al.*, 1999).

But establishment of forest-based industries has not been allowed within 3 km (in hills) and 5 km (in Terai) from the forests. If some traders, growers or CFUG members wish to establish and operate such enterprises, this distance limit will be a major constraint. Present regulatory framework states that an FUG can establish industry based on the raw materials from its own forests or a group of community forests. However, it is not clearly defined that whether a CFUG can legally get raw materials from other sources like private or government forestlands for operating their enterprise.

7.2.9 Issues related to government royalty rates and taxes on NTFPs

Department of Forests collects royalty on NTFPs collected from the forests as per the rates specified in the Forest Regulations of 1995. However, the current system of determining royalty rates by the government is found to be arbitrary and needs periodic revisions. The rates cannot change until the regulstions are changed. The royalty rate has to be fixed on the basis of conservation, sustainable utilization and market potential of the NTFP resources. Several types of taxes imposed by District Development Committees and Village Development Committees and local institutions have discouraged NTFPs trade and its promotion in a private level. As a result, direct beneficiaries are significantly loosing their share of income.

7.2.10 Training and capacity building efforts

Training and capacity-building programmes are inevitable to increase the local capacity. In order to realize that such services reach the communities in need, the government should explicitly recognize the role of NGOs and the private sector. However, it is equally important that NGOs feel more responsible and impart quality services. A mechanism needs to be developed so that research results can be transferred to the local communities and private growers on propagation, management and sustainable harvest of NTFPs.

Lack of proper training among the personnel involved in cultivation and sustainable management has hindered the domestication of NTFPs. Similar responses were received from custom officials involved in dealing with NTFPs at custom checkpoints. Nepal Biodiversity Strategy (2002) has clearly spelled out the importance of NTFPs by putting a separate heading in the main document. Short-term training on MAPs to forest officials and NTFPs identification training for customs officials has been included in the boidiversity conservation program.

7.3 Summary of conclusions

Awareness about the crucial role that the NTFPs play in supporting the livelihoods of the forest-dependent communities has grown manifolds in the recent years. Policy makers, funding organizations, governments and voluntary organizations working in the forestry sector are convinced that sustainable management of NTFPs has become an inseparable part of pro-poor forest management. In order to improve the policy

framework, the MFSC needs to continue dialogue with the stakeholders, line agencies and the traders in the overall production of NTFP, including cultivation and management to minimize the hurdles. A review of existing government policies, rules and regulations, royalty rates need to be revised on regular basis for the sustainable development of NTFP resources in Nepal.

Provisions should be created to make sure that the collectors and the CFUGs get fair return from NTFPs. The expanding market of NTFPs on the one hand, and the challenge of improving rural livelihood on the other, demand a more sustainable, efficient and scientific management of NTFP resources in a framework that provides opportunities to growers, collectors, local traders and the end consumers.

There is a lack of information on appropriate cultivation and management techniques of NTFPs, which vary significantly with the species. The DPR and DFRS under the MFSC, NGOs/INGOs involved in the NTFP development and the role of industrial enterprises such as HPPCL and Dabur-Nepal can be crucial in this context. The situation also calls for effective training and extension services.

7.4 Recommendations

These recommendations are based on the results of the present study, interaction and consultation with different stakeholders such as CFUGs, traders, growers, DFOs and people involved in collection of NTFPs from the forest.

- There is an urgent need to launch a programme aimed at conservation and sustainable development of NTFPs in the tropical regions of Nepal.
- There is an urgent need to develop cultivation and management techniques for high value NTFPs such as Kurilo, Sarpagandha, bamboo, rattan, sabai grass and Amriso as there is growing interest of CFUGs, and private growers towards these NTFPs. Similarly, technology for other potential NTFPs of different regions should be gradually developed.
- The coordination between the Department of Plant Resources (DPR), DFRS and Institute of Forestry (IOF) should be institutionalised so that students have free option to choose potential NTFPs for an elective course. The specialised course on NTFPs needs to be started.
- The scope and opportunities for NTFP management within community forests and leasehold forests needs to be widened for which the Forest Acts 1993, Regulations 1995 need to be revised to meet the present challenges.
- Scientific research on NTFPs should be planned and executed to fill the information gap on cultivation and management. The active involvement of the concerned stakeholders in such participatory action research is of utmost importance.
- A mechanism needs to be developed so that cultivators and collectors get reasonable price for the NTFPs products. HMGN's role as regulatory body is important in this context.

- Traders should be trained on eco-friendly harvesting methods of NTFPs, as messages can be easily communicated to the collectors via traders.
- Based on agro ecological zones and climatic conditions, pocket programmes should be launched by the government and NGOs to exploit full potentials of high value NTFPs.
- Promotion of aromatic plants such as Mentha and Chamomile without replacing the main crop in farmland as intercrops can play a significant role to create extra employment/ income generation opportunity in the Terai and Inner-Terai Regions of Nepal.
- Relevant resource centre should be established for high value Bamboo, Rattan, Sarpagandha, Kurilo, Lemongrass, Citronella, and Mentha in eastern region; likewise Kurilo, Lemongrass, Citronella, Mentha, Chamomile, and Sabai grass in central regions; Bamboo, Rattan, Amliso, Sabai grass in western region to supply seed/saplings, technical know-how to the farming communities.
- Enrichment plantings using locally collected materials should be encouraged, particularly in areas where NTFPs have been depleted by uncontrolled collection, and unscientific management activities and/or biotic disturbances.
- Ministry of Forest and Soil Conservation should also involve in continuing short-term training on MAPs to their employees and to those involved from the Customs Department.
- Applied research is needed in cultivation and domestication of high value NTFPs.
- Research is also needed on developing appropriate methodology for NTFPs resource inventory, forecasting the yield, determining sustainable harvesting thresholds and quality of products.
- The government system of issuance of permit for NTFPs collection by DFOs needs to be revised. The permits should be issued in the districts where they are originated and quantity permitted should be based on resource inventory and environmental impact assessment.

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Annex 1

List of Traders Interacted in Nepal

Annex 1.1: List of Traders and Organizations visited in Eastern Nepal

S.No.	Form Name	Name of the Respondents	Address
Traders			
1	Taparia Exports	Mr. Manoj Tapari	Panitanki, Biratnagar, P.Box: 54, Tel: 021-22526, Fax: 977-21-24441 E: javanti@ccsl.com.np
2	R.J.N. Enterprises	Mr. Nanda Kishore Shah	Dhahran, Sunsari
3	RK Traders	Mr. Rajendra K. Agrawal	Dhahran, Sunsari
4		Mr. Harka B. Katuwal	Dhahran, Sunsari
5		Mr. Rajendra P. Jaiswal	Dhahran, Sunsari
6	M A Traders	Mr. Mahesh Agrawal	Dhahran, Sunsari
7		Mr. Pemba Lama	Basantpur, Terhathum
8		Mr. Gopal Bhujel	Basantpur, Terhathum
9		Mr. Bhim B. Karki	Basantpur, Terhathum
10		Mr. Ganesh paudel	Basantpur, Terhathum
11	Rudraksha S&B Centre	Mr. Ganga Ram Sharma	Hile, Dhankuta
12	Ban And Traders	Mr. Tej P. Rai	Hile, Dhankuta
13		Mr. Indra Jit Tamang	Hile, Dhankuta
14	Lama Enterprises	Mr. Sher B. Tamang	Hile, Dhankuta
15	Shanti Traders and Suppliers	Mr. Sher B. Rai	Hile, Dhankuta
16	Tejpat K&B Centre	Mr. Ratna B. Shrestha	Gaighat, Udayapur
17		Mr. Oli Mohabbad	Trijuga, Udayapur
18		Mr. Jogendra Gupta	Beltar, Udayapur
19		Mr. Lalan Das	Beltar, Udayapur
20	Bindal Traders	Mr. Indra Bindal	Birtamod, Jhapa
21	Shiv Sagar Stores	Mr. Almu Shah	Chandranigahpur, Rautahat
22		Mr. Suraj Kumar Shrestha	Chandranigahpur, Rautahat
23	Krishna Enterprises	Mr. Raj Kumar Rauniyar	Kanchanpur, Saptari
24	Sugia Enterprises	Mr. Surev Mahato	Sabaila, Dhanusa
25		Mr. Laxmeswor Chaudhary	Janakpur-4, Dhanusa
CFUGs			
26	Shanti Nagari CFUG	Mr. Nar B. Moktan (C)	Itahari, Sunsari
27	Chaite CFUG	Mr. Hikmat B. Khadka (S)	Basantpur, Terhathum
28	Dumre Sanne CFUG	Mr. Jhamak Katuwal (T)	Belhara, Dhankuta
29	Chappan CFUG	Mr. Min B. Raut (C)	Trijuga, Udayapur
30	Jagriti Mahila CFUG	Mrs. Tirtha Kumari	Paurahi-4, Rautahat
31	Radha Krishna CFUG	Mrs. Mithila Devi	Lal Bandi, Sarlahi
32	Shimbhu CFUG	Mr. Surendra Raj	Khayarmara, Mahottari
Private Grower			
33		Mrs. Sharada Basnet	Basantpur, Terhathum
34		Mr. Gopal Bhujel	Basantpur, Terhathum
35		Mr. Gambhir B. Rai	Aaptar, Udayapur

DFO			
36	District Forest Office	Mr. Shekhar Kumar Yadav	DFO, Udayapur
37	District Forest Office	Mr. Murari P. Pokharel	DFO, Dhankuta
38	District Forest Office	Mr. Mohan Koirala	DFO, Sunsari
39	District Forest Office	Mr. Sampain Yadav	DFO, Sarlahi
40	District Forest Office	Mr. Ram Briksha Thakur	DFO, Saptari
41	District Forest Office	Mr. Khusi Lal Chaudhary	DFO, Siraha
42	District Forest Office	Mr. Chandra Man Dangol	DFO, Rautahat
43	District Forest Office	Mr. Kiran Shrestha	DFO, Mahottari
44	District Forest Office		DFO, Dhanusa
Processing Co.			
45	HPPCL	Mr. Bijaya Man Sthapit	Tarhara, Sunsari
46	Shree Pashupatinath Aaurved Bhawan	Dr. Nanda Kangijha	Shivanagar, Rautahat
47	Nepal Mentha Product Pvt. Ltd	Mr. Ashok Karna Singhwan	Sagarnath, Sarlahi
Custom Office			
48	Mechi Custom Office		Kakadvitta, Jhapa
49	Morang Custom Office	Mr. janak, Pant	Rangelai, Biratnagar
50	Trade Promotion Centre	Mr. Dilip Aryal	Pokharia, Morang
51	Mechi Udyog & Byapar Sangh,	Mr. Narendra Khadka, Chairperson,	Dhulabari, Jhapa Tel: 60035

Annex 1.2: List of Traders and Organizations visited in Central Western Nepal

District	Person contacted	Status
Rupandehi	Mr. Krishna Prasad Dhakal	Assistant Forest Officer
	Mr. Sanat Adhikari	Broom grass Trader
	Mr. Saha	Trader
	Mr. Laxman Acharya	Secretary Sivnagar Community Forest, Butwal
	Mr. Sital Kumar Barnawal	Trader, Butwal
	Mr. Suresh Kumar Jaisawal	Trader Butwal
Kapilvastu	Mr. Santa Muni Tamrakar	Forest Officer
	Mr. Ahasan Hasan	Industrialist
	Mr. Umesh Kumar Basnet	Custom Officer, Krishnagar
Nawalparasi	Mr. Santosh Barunwal	Trader
	Mr. Prakash Nigam	Trader
	Mr. Lokraj Nepal Mr. Govinda Dhal	Assistant Forest Officer and Ranger
	Mr. Ajud Wagle	Secretary, Dhuseri CFUG, Rajhar, Nawalparasi
Chitwan	Mr. Madav Giri Mr. Gopi Prasad Pathak	Chair person and Member, Kalika Community Forest
	Mr. Indra Bahadur Magar and Mr. Nar bahadur Magar	Langhali Leasehold Forest, Darechok-3, Mugling
	Mr. Man B. Gurung and Mr. Dhan B. Gurung	Iccha Kamana Leasehold Forest, Darechok-4 Chitwan
	District Forest Office, Chitwan	
Makawanpur	Ramanthali Leasehold Forest	Padampokhari-3, Makawanpur
	Mr. Muneshower Adhikari	Brikuti Palp Industry Purchasing Officer, Raw Material Section
	Mr. Hup Raj Giri	Brikuti Palp Industry Purchasing Assistant, Raw Material Section
Parsa		
Bara	Mr. Surya Prasad Joshi	DFO Bara
	Mr. Sambhu Prasad Jaisawal	Range Post Chief Pasaha
Parsa	Mr. Kedar Nath Kattel	Ranger, Wildlife, Parsa
	Mr. Ram Hari Sedhai	Forest Officer, District Forest Office Hetauda
	Mr. Chakra Man Shaykya	Act. Regional Director, RD Office Hetauda
	Mr. Sukhdev Chaudhary	Campus Chief, IFO Hetauda
	Mr. Laxman Sundar Shrestha	Lecturer, IFO Hetauda

Annex 1.3: List of Traders and Organization Visited in Far and Mid-Western Development Regions

Banke District:

1. Diwakar Pathak, District Forest Officer (DFO), District Forest Office, Nepalganj, Banke
2. Badri Karki, Assistant Forest Officer, Ilaka Ban Karyalaya, Kohalpur, Banke
3. Rabindra Nath Shukla, Manager, Herbs Production and Processing Company Ltd., Nepalganj
4. Laxmi Datta Pant, Production Officer, Herbs Production and Processing Company Ltd., Nepalganj
5. Sunil Kumar Acharya, Assistant Scientific Officer (Botanist), District Plant Resource Office, Nepalganj
6. Hem Raj Paudel, Assistant Botanist, District Plant Resource Office, Nepalganj
7. Chakrapani Sharmacharya, Custom Officer, Custom Office, Nepalganj
8. Mahendra Prasad Chaudhari, Assistant Plant Quarantine Officer, Plant Quarantine Office, Nepalganj
9. Padma N. Paudel Project Manager, Buffer Zone Development Project, CARE Nepal, Nepalganj
10. Dev Raj Gautam, Ban Sajhedari Program, CARE Nepal, F. P. P., Nepalganj
11. Raj Rati Tharu, Private Forest Holder, Kohalpur VDC - 4, Banke
12. Tek Bahadur Tharu, Jalandhara CFUG, Mahadevpuri VDC-6, Banke
13. Mahila Upakar CFUG, Pragatinagar, Kohalpur VDC-3, Banke
14. Rajesh Kumar Jain, Trader/Processor/Exporter, Simki Trade Centre, Gharbari Tole, Nepalganj
15. Shyam Kumar Tandon, Trader, Kirana Traders, Sadar Lane, Nepalganj
16. Madhukar Thapa, Trader/Exporter, Thapa Enterprises, Phultekra Lane, Nepalganj
17. Babu Ansari, Trader/Exporter, Phultekra Lane, Nepalganj
18. C. L. Agrawal, Trader/Exporter, Mittal Trading Co., Surkhet Road, Nepalganj
19. Mohammad Ishaat Halwai, Trader/Exporter, Ghoshi Tole, Nepalganj
20. Mohammad Idris Halwai, Trader/Exporter, Nepal Kirana Traders, Ghosi Tole, Nepalganj
21. Mohammad Salim Halwai, Trader/Exporter, Natural Goods Store, Ghoshi Tole, Nepalganj
22. Mohammad Yusuf, Trader/Exporter, Bheri Kirana Store, Ghosi Tole, Nepalganj
23. Mohammad Ishaak Halwai, Trader/Exporter, Ghosi Tole, Nepalganj
24. Mohammad Yunus, Trader/Exporter, Sama Enterprises, Ramnagar, Nepalganj
25. Mohammad Hussain Halwai, Shahwaj Traders, Ghosi Tole, Nepalganj
26. Sanjay Kumar Jain, Trader/Processor/Exporter, Bahubali Herbal essence & Extracts Pvt. Ltd., ganapur VDC, Nepalganj
27. Faij Mohammad, Trader/Exporter, Faij Mohammad & Co., Ghosi Tole, Nepalganj

Bardya District:

28. District Forest Office, Gularia, Bardiya
29. Barna Bahadur Thapa, Assistant Warden, Royal Bardiya National Park, Bardiya
30. Sushila Nepali, TAL, Royal Bardiya National Park, Bardiya
31. Deb Rana, NTFP Farmer, Gulariya Municipality - 1, Bardiya
32. Radha Krishna Mahila CF, Gulariya, Bardiya
33. Belapur Tharu CFUG, Bardiya

Dang District:

34. District Forest Office, Dang
35. Shree Basanta Hariyali CFUG, Akhabare, Ghorsi, Dang
36. Shree Manakamana Mahila CFUG, Tribhuvannagar Municipality, Dang
37. Chudamani Adhikari, Administrator, Shree Mahendra Sanskrit University, Dang
38. Dev Mani Devkota, Medicinal Plant Farmer, Bijauri VDC-4, Dang
39. Bhuman Singh Oli, Junior Technician (J. T.), District Soil Conservation Office, Tulsipur, Dang
40. Shankar Dayal Soni, Herbal Trader, Hari Om Traders, Tulsipur, Dang
41. Ambapur Medicinal Plant Nursery, Ambapur, Dang
42. Ratna Lakshmi Thapa, Vice-Chairperson, FECOFUN District Chapter
43. Laxman Singh Thapa, Medicinal Plant Farmer, Kabhre VDC-3, Gulthepani, Dang
44. Mohammad Yakub Ansari, Trader, Ansari Kirana Pasal, Tulsipur, Dang
45. Kamal Kanta Sony, Trader, Paban Traders, Tribhuvannagar Municipality, Dang
46. Lum Prasad Pandey, Nursery Naike, Ambapur Medicinal Plant Nursery, Dang
47. Salauddin Faruk, New Faruk Enterprises, Tribhuvannagar, Dang

Surkhet District:

48. Regional Forest Directorate, Birendranagar, Surkhet
49. District Forest Office, Surkhet
50. Hem Raj Adhikari, NTFP Trader, Adhikari Enterprises, Chhinchu, Surkhet
51. Raju Gupta, NTFP Trader, Chhinchu, Surkhet
52. Indra Bahadur KC, NTFP Trader, Birendranagar-6, Surkhet
53. Mohammad Atiullaha, Trader, Bidya Jadibuti Store, Birendranagar-6, Surkhet
54. Uday Bahadur Gautam, NTFP Farmer, Ward No. 6, Birendranagar, Surkhet.
55. Shree Ambikadevi CFUG, Gagretal, Jarbuta, Surkhet
56. Dhan Bahadur Thega, Secretary, Jagriti CFUG, Chalaute, Birendranagar Municipality, Surkhet
57. Mitra Upadhyay, District Coordinator, CARE Nepal

Kailali District:

58. Nabaraj Baral, District Forest Officer (DFO), Kailali
59. Subhash Prasad Shrestha, Custom Officer, Custom Office, Kailali
60. Ms. Lalita Acharya, Treasurer, Tegnuwa Mahila CFUG, Kailali
61. Mohan Bahadur Rawal, Chairperson, Sati Karnali CFUG, Kailali
62. Custom Office, Dhandadi, Kailali

Kanchanpur District:

63. Rishiram Tripathi, District Forest Officer (DFO), District Forest Office, Kanchanpur
64. Jaya Prasad Joshi, Act. Custom Officer, Custom Office, Gaddachauki, Kanchanpur
65. Deb Bahadur Dhami, Secretary, Batabaran CFUG, Kanchanpur
66. Baitada CFUG, Kanchanpur

Annex 2

List of Traders and Organizations visited in India

Annex 2.1: List of Traders and Organizations visited Silguri

1	PC Jain and company	Mr. Babu Lal Jain	babulal23@sifu.com
2	NC Jain and Company	Mr. Bhoj Raj Jain	
3	Mr. P. K. Dutta Chaudhary (Datta Babu	CHEMEFORM	
4	Chantmal Joshi		Joshi Kunj, ITI Mode, Opposite Hotel Suchitra 2nd. Mile, Svebak Road Silguri Tel 546476, 546030.

Annex 2.2: List of Traders and Organizations visited in Kolkata

5	Excel Drug House	Mr. Manoj Gathani	18-B, Sukeas Lane, Kolkata 700 001 Tel. 242 8571, 242 1254, e-mail: edhacal@vsnl.net Contact persons:
6	Harek Chand Kale Ram	Mr. Babu Lal Jain	26/4-A, Armenian Street, Jhagada Kothi, Tel. 238 5267, 235 8835®, Kolkata
7	Natural Drugs	Mr. Sanjay Prakash	26/4 A, Armenian Street, Kolkata 700 001,India. Phone: 0091 33 231 3242/ 218 2850 Fax: 0091 33 235 1045
8	Kanchanjunga Herbal Medi Aids pvt. Ltd.	Mr. Ashish Agrawal	406, Marshall House, 4th. 25 Stand Road or 33/1 N S Road, Kolkata 700001 Tel: 91 33 221 3696 fax: 91 33 220 5228
9	Daga Ji and Sons		Jhagada Kothi, Armenian Street, Bada Bazar Kolkata

Annex 2.3: List of Traders and Organizations visited in Lucknow, Kannauj and Kanpur

S.No.	*City*	*Traders/Industrialist*	*Address*
1	Lucknow	Mr. Ram Chandra Gupta	Lucknow Kirana Company 88 Subhash Marg, Tel 265216, 265219
2		Mr. Nischal Suri	Perfume and essential oil Co. Manufacturer of Natural Attars and essential oils 47-48 New Market Keshar Bag, Tel 272309, 222040, 221120
3		Mr. Rahul Mehrotra (Creative perfumr)	Nandamahal Road, Lucknow, tel 266650,265171,251019
4		Mr. S K Jain	Kanhya Lal Ashok Kumar, Rawab Ganj, Tel 265441, 266094
5		Mr. Chunna Mal	Chunnamal Ramdayal, Amina Bad Sabjimandi, Tel 226160,
6		Mr. Narendra Nath	Lalji Aromatic, Rakhab Gunja,
1	Kannoj	Mr. A K Gupta	Bhartiya Jadibuti Bhandar, Tel 34378,35703,
2		Mr. JN Kapoor	Jagat Aroma Oil Distillery Tel: 34401
3		Mr. Abhay Gupta	Flower perfumes manufactures Company Tel 34583, 34435
4		Mr. Abhaya Gupta	Flowers perfumrs
5		Mr. Gupta	Supreme Enterprises, Opposite to PPDC/FFDC
6		Mr. Pamppi Jain	Pragati Aroma Oil Distillers (p) Ltd, Deedar Ganj, Chhipatti, Tel. 34317, 34614
1	Kanpur	Mr. Radhe Lal	Radhe Lal and Sons 51/7 Ramgunj, Nayagunj
2		Mr. Rameshower Prasad	Krishna Gopal and Co. 53/7 Nayagunj
3		Mr. Lohit Sukla	Laxmi Essential Oil and Fragrance (p.0Ltd 24/37Gopal Bhawan, Birhana road. Tel 317686,352962,
4		Mr. SK Gupta	Nandi Traders 51/7 Ramgunj, Nayagunj, Kanpur
5		Mr. Rajendra Kumar	Rajendra Kumar Vijay Kumar 51/7 Ramgunj, Nayagunj

Annex 2.4: List of Traders and Organization visited in Tanakpur and Delhi

Tanakpur:

1. A. S. Sharada, Sharada Enterprises, Tanakpur
2. Deepak Sharada, Sharada Brothers, Tanakpur
3. Vijaya Kumar, Mahesh Chandra and Sons, Tanakpur
4. Agrawal Traders, Tanakpur, Naini Tal
5. R. K. Gupta, Gupta Traders, Bus Station, Tanakpur

Delhi:

1. Vijay Kumar, Urmila Traders, Khari Baoli, Delhi
2. Sanjay Agrawal, National Herbs Company, Khari Baoli, Delhi
3. Mohammad Hasan, Allied Trading Corporation, Khari Baoli, Delhi
4. Rashid Hasan, Mohammad Hussain Ajmal Husain, Khari Baoli, Delhi
5. Raj Kumar Gupta, Om Trading Co., Khari Baoli, Delhi
6. Raj Kumar Gupta, Herbs and Kirana Association (Regd.), Khari Baoli, Delhi
7. Bale Gupta, Gupta Trading Co., Khari Baoli, Delhi
8. Om Prakash Gupta, Om Prakash Vijay Kumar, Khari Baoli, Delhi
9. Vivek Seth, Jagdish Kumar Hari Om and Co., Khari Baoli, Delhi
10. R. K. Singhal, H. M. and Sons, Khari Baoli, Delhi
11. Sant Kumar Sanganeria, Ultra International Ltd., Connaught Circus, New Delhi
12. Ben Dhanuka, Morels India Pvt. Ltd., Greater Kailash, New Delhi
13. Baburam Harichandra, B. H. Trading Co., Khari Baoli, Delhi
14. Sunil Kumar Sharma, Arian Enterprises, Shakarpur, Delhi
15. Mukesh Kumar, Balaji Overseas Co., Khari Baoli, Delhi
16. Vivek Goal, Banwarilal Shreeram, Khari Baoli, Delhi
17. Sunil Chand, Nanak Chand Sandeep Kumar, Khari Baoli, Delhi
18. Padam Chand Agrawal, Nanak Chand Agrawal & Brothers, Khari Baoli, Delhi
19. Narendra Kumar Gupta, Payal trading Co., Khari Baoli, Delhi
20. Mohit Gulati, BMV Fragrances Pvt. Ltd., Vikashpuri, New Delhi
21. Alok Gupta, Kanta Chemical Co., Khari Baoli, Delhi
22. Gaurav Vij, G.V. Chemical India Ltd., Ananda Bihar, Delhi
23. Pushp K. Jain, Medicinal Plant Trade Specialist, TRAFFIC-India, WWF India. Lodhi Estate, Lodhi Road, New Delhi.

Annex 3

Community Forests visited in Eastern Region of Nepal

1. Shantinagari CFUG, Itahari-2, Shantinagar, Sunsari

1. Area ofCF Area: 200 ha
2. Year of establishment: November 1998.
3. HH No.: 1370
4. Major NTFPs : Citronela, Harro, Barro, Rajbrikchha,
5. Major NTFPs cultivated by farmers (1) Citronella (2) Ritha
   - Market: Dharan

Suggestions for improvement

1. Provide trainings and workshops on NTFP cultivation/management and collection of seeds.
2. Control Banmara (*Eupatorium species*) and encourage CF users to cultivate citronella.
3. Establish small processing unit at local level to add the value of products.
4. Lay some demonstration plot to exhibit the success of NTFPs cultivation/management.

2. Chaite CFUGs Basantapur-3, Terathum

1. Community Forest registered on: January 1996
2. Area of the C.F.: 226.38 Ha.
3. No. of Households: 248
4. NTFP management provision in OP: Not included
5. Major NTFPs in the forest: Argeli, Lokta, Allo, Malingo, Chiraita
6. No of CF users involved in cultivation/management of NTFPs
   - In CF 25 HHs
   - In private forests 20 HHs
7. Major NTFPs cultivated by farmers: (1) *Swertia chirayita*- (Chiraito)
   (2) *Edgeworthia gardnerii* (Argeli): 500 Kg/year.

Suggestions for improvement

1. Control on eroded and landslide areas.
2. Ban on grazing in CF areas.
3. Simplify the quarantine process for export NTFPs.
4. Provide soft loan to NTFP cultivation.
5. Provide reasonable price of products to rural farmers.
6. Establish small processing unit at local level to add the value of products.

3. Dumresanne CFUG, Belhara -2, Dhankuta

1. Area CF Area:
2. Year of establishment: July 1993
3. HH No.:
4. Major NTFPs of CF: Citronela, Khoto, Lemon Grass, Mentha.
5. No of CF users involved in cultivation /management of NTFPs
   In CF 9 HHs
   In private land 5 HHs (Farm boundaries, roadsides etc.)

- Major collectors CF users (male)
- Major NTFPs cultivated by farmers (1) *Citronella (2) Mentha (3) Pinus (4) Thysanoalena maxima-Amlisho (5) Bambusa sp. (Bans)*
- Market (Collector) HPPCL and Surya Resin and Turpentine Co. (SRTC)

Suggestions for improvement

1. Distribute seedling and saplings/seeds of those plants that give immediate production and good market price.
2. Provide training and workshops on NTFP cultivation/management and collection of seeds.
3. Initiate plantation activities in wastelands and open forests.
4. Create income generation activities for rural poor.

4. Chappan CFUG, Triyuga-2, Udayapur

1. CF Area: 1105 Ha.
2. Year of establishment: April 1996
3. HH No.: 881
4. Major NTFPs Of CF: Harro, Barro, Kurilo, Amala, Ritha, Bhorla Leaf, Sal Dhup.
   No of CF users involved in cultivation/management of NTFPs in CF < 20 HHs
   - In private forests 4 HHs
   - Major collectors CF users (men)
   - Major NTFPs cultivated by farmers (1) *Cinnamomum tamala*-Tejpat (2) *Emblica officinalis*- Amala (3) *Asparagus racemosus* -Kurilo
   - Market: Gaighat, Triyuga Metropolitan city

Suggestions for improvement

1. Control on timber smugglers and immigrants.
2. Ban on grazing in CF areas and control flood.
3. Conduct CF inventory, thinning, pruning and selective lopping.
4. Provide soft loan for cultivation.
5. Provide training and workshops on NTFPs cultivation /management and collection of seeds especially to CFUC members.
6. Conduct NTFP extension activities for increasing rural livelihoods.

Note: Kurilo, Amala, Harro, Bamboo, Amriso, Barro are the common NTFPs found in all CF.

Annex 4

Community Forests visited in Central Region of Nepal

1. Jagriti Mahila CFUG, Pourahi-4, Rautahat

1. CF Area: 27Ha.
2. Year of establishment: 1999
3. HH No.: 99
4. Major NTFPs Of CF: Aathingare, Harro, barro, Kurilo

No of CF users involved in cultivation/management of NTFPs

- Major collectors CF users (men)
- Major NTFPs cultivated by farmers
- Market: Chandranighapur

Suggestions for improvement

1. Ban on grazing in CF areas and control flood.
2. Inventory of CF and thinning, pruning and selective lopping.
3. Provide training and workshops on NTFPs cultivation /management.
4. Distribute seeds/seedlings and saplings of important NTFPs.

2. Radha Krishna CFUG, Lal Bandi, Sarlahi

1. CF Area: 49 Ha.
2. Year of establishment: 2000
3. HH No.: 126
4. Major NTFPs of CF: Harro Barro, Kurilo, Rajbrikchha,Sarpaghandha, Pipla, Neem Kuju, Simal, Amala, Tejpat, Terminalia.
   - No of CF users involved in cultivation/management of NTFPs
     In CF< 2 HHs

   In private forests
   - Major collectors CF users (men and women)
   - Major NTFPs cultivated by farmers (1) *Azadirachta indica* (Neem) (2) *Emblica officinalis*- Amala
   - Market Bardibas, Chandranighapur

Suggestions for improvement

1. Ban on grazing in CF areas and control flood.
2. Inventory of CF and thinning, pruning and selective lopping.
3. Organize training and workshops on NTFPs cultivation /management and collection of seeds especially to CFUC members.
4. Encourage local farmers to cultivate and support them for effective management of NTFPs.

3. Simbhu CFUG, Khayar mara-1, Mahottari

1. CF Area: 300 Ha.
2. Year of establishment: 2001
3. HH No.:
4. Major NTFP of CF: Kurilo, Harro, Barro, Simal, Makai jara, Chiraita, Rajbrikchha.

No of CF users involved in cultivation/management of NTFPs

In CF

In private forests

- Major collectors CF users (men)
- Major NTFPs cultivated by farmers
- Market: Bardibas

Suggestions for improvement

1. Ban on grazing in CF areas and control flood.
2. Inventory of CF and thinning, pruning and selective lopping
3. Organize and provide trainings and workshops on NTFPs cultivation/management and collection of seeds especially to CFUC members.

4. Kalika CF, Birendra Nagar, Khirahai, Chitwan.

1. Community Forest Registered on: June 2000
2. Area of the C.F.: 1027.5 ha.
3. No. of Households:
4. NTFP management provision in OP: included
5. Major NTFPs in the forest: Amriso, Kurilo, Harro, Barro, Chuyri, Bans, Amala, Ritha, Pipla etc.
6. NTFP promotion activities:
   - Conservation of forest and NTFP species through control on grazing, fire and encroachment.
   - Guarding system: Alopalo system (conservation of existing Naturally grown NTFPs)
   - No nursery yet established.
   - Income generation activity: ***200 Kurilo*** seedling is planted in CF.
   - Training/Capacity building: Not yet provided.

Problems

- Unknown about NTFPs value
- Marketing.
- Identification
- Training.

Suggestions for improvement

- Identification of NTFPs
- Training on NTFPs cultivation and Management.
- Training on marketing channels.

5. Ageegre CF, Chinapur 1,2,3 & 6, Chitwan

1. Community Forest Registered on: May 1997
2. Area of the C.F.: 290 ha.
3. No. of Households:
4. NTFP management provision in OP: included
5. Major NTFPs in the forest: Amriso, Kurilo, Harro, Barro, Chuyri, Bans, Amala, Amaro, Thakal, Bet, Nigalo, Ritha, Pipla etc.
6. NTFP promotion activities: Plantation *of 480 seedling of Bet* in CF.
   - Conservation of forest and NTFP species through control on grazing, fire and encroachment
   - Training/Capacity building: Not yet provided.
   - No nursery yet established.
   - Training/Capacity building: Not yet provided.

Problems

- Unknown about NTFPs value
- Marketing.
- Identification
- Training.

Suggestions

- Identification of NTFPs
- Training on NTFPs cultivation and Management.
- Training on marketing channels.

Annex 5

Community Forests visited in Western Region of Nepal

1. Dhusari CF, Rajahar-7, Nawalparasi

1. Community Forest Registered on: May 1995
2. Area of the C.F.: 67.5 ha.
3. No. of Households:
4. NTFP management provision in OP: included
5. Major NTFPs in the forest: Amriso, Kurilo, Harro, Barro, Chiuri, Bans, Amala, Amaro, Bet, Nigalo, Ritha, Pipla, Asogandha, Sarpagandha etc.
6. NTFP promotion activities: **160 species of NTFPs** identified with close collaboration with NGO.
   - Conservation of forest and NTFP species through control on grazing, fire and encroachment.
   - Training/Capacity building: Not yet provided.
   - No nursery yet established.
   - Training/Capacity building: Not yet provided.

Problems

- Unknown about NTFPs value
- Marketing.
- Identification
- Training.

Suggestions

- Identification of NTFPs
- Trainings on NTFPs cultivation and Management.
- Training on marketing channels.

2. Shivanagar CF, Butwal, Rupandehi

1. Community Forest Registered on:
2. Area of the C.F.: 339.75 ha.
3. No. of Households:
4. NTFP management provision in OP: included
5. Major NTFPs in the forest: Amriso, Kurilo, Amala,, Pipla, , Sarpagandha etc.
6. NTFP promotion activities:
   - Conservation of forest and NTFP species through control on grazing, fire and encroachment.
   - Training/Capacity building: Not yet provided.
   - No nursery yet established.
   - Training/Capacity building: Not yet provided.

Problems

- Unknown about NTFPs value
- Marketing.
- Identification
- Training.

Suggestions

- Identification of NTFPs
- Trainings on NTFPs cultivation and Management.
- Training on marketing channels.

Annex 6

Community Forests visited in Mid Western Region of Nepal

1. Sri Manakamana Mahila CF, Ghorai-10, Dang

1. Community Forest Registered on: 1998
2. Area of the C.F.: 4.75 ha.
3. No. of Households: 27
4. NTFP management provision in OP: Not included
5. Major NTFPs in the forest: Sarpagandha, Kurilo, Harro, Barro, Ritha, Bans, etc.
6. NTFP promotion activities:

- Conservation of forest and NTFP species through control on grazing, fire and encroachment.
- Guarding system: Since last two years, no formal CF guard due to shortage of funds.
- No nursery yet established.
- Income generation activity: Recently, 1500 seedlings of Sarpagandha have been planted in 3 katha of the community forestland. Recently, in collaboration of CARE-Nepal, 2000 seedlings of Babul and Sal have been transplanted in the CF.
- Training/Capacity building: Not yet provided.

2. Basanta hariyali CF, Akabare, Ghorsing, Dang

1. Community Forest Registered on: 1995
2. Area of the C.F.: 270 ha.
3. No. of Households: 145
4. NTFP management provision in OP: Not included
5. Major NTFPs in the forest: Gurjao, Dalchini, Sarpagandha, Sugandhakokila, Harro, Barro, Asuro, Ritha, Amala, Bel, Arjun, Chiuri, Rajbrikhsa, Timur, etc.
6. NTFP promotion activities:

- Conservation of forest and NTFP species through control on grazing and fire, and enrichment plantation.
- No formally employed CF Guard
- No nursery established
- Income generation activities: Nothing except for fining Rs. 100 and Rs. 25 respectively for each cow/buffalo and goat.
- NTFP Cultivation in the CF: None
- Training/Capacity building: None.

3. Jalandhara CF, Mahadevpuri, Banke

1. Community Forest Registered on: 2055
2. Operation Plan Renewed on: 2059
3. Area of the C.F.: 76 ha.
4. No. of Households: 82
5. NTFP management provision in OP: Included
6. Major NTFPs in the forest: Pipla, Kurilo, Harro, Barro, Amala, Tendu, Khair, Musli, Bel, Kauso, Rohini, Mahuwa, etc.
7. NTFP promotion activities:

- Conservation of forest and NTFP species through control on grazing and fire, and enrichment plantation.
- Employment of a CF Guard @1500/month
- Establishment of a NTFP nursery
- NTFPs in the nursery include: Pipla, Kurilo, Sarpagandha, Harro, Barro, Amala, Sarpagandha, Kauso, Bas and Bet.
- Income generation activities: Sale of NTFP seedling earned Rs. 24000 last year.65 kg of Pipla was marketed @Rs. 85/kg last year.
- NTFP Cultivation in the CF: Sarpagandha: 1.5 katha, Bet:12 katha, Sikakai: 1800 plants
- Training/Capacity building: 7-10 days' training on NTFP conservation, management, cultivation and marketing.
- Training provided by: Ban Udhyam, Care-Nepal, DPR.

4. Mahila Upkar CF, Pragatinagar, Kohalpur, Banke:

1. Community Forest Registered on: 1995
2. Operation Plan Renewed on: 2002
3. Area of the C.F.: 25.6 ha.
4. No. of Households: 41
5. NTFP management provision in OP: Included
6. Major NTFPs in the forest: Dhairo, Kusum, Bhorla, Khair, Simal, Jamun, Indrajau, Amaltas, Sarpagandha, Pipla, Satabar, Harro, Barro, Amala, Tendu, Khair, Musli, Bel, Kauso, Rohini, Mahuwa, etc.
7. NTFP promotion activities:

- Conservation of forest and NTFP species through control on grazing and fire, and enrichment plantation.
- Establishment of a NTFP nursery
- NTFPs in the nursery include: Satabar, Sarpagandha, Bakaino, Kusum, Neem, Bans, Bet, Amriso
- Income generation activities: Sale of NTFP seedling like Sissoo, Bakaino, Bans and Bet.
  Sale of Tendu leaves last year (400 kg)
  Sale of Bel fruits this year (300 kg)
- NTFP Cultivation in the CF:Satabar, Sarpagandha, Amriso, Bans, Bet, Bakaino, Kusum, Neem.
- Training/Capacity building: 10 days' training on NTFP conservation, management, cultivation and marketing.
- Training provided by: CARE-Nepal/DFO/Ban Udhyam, Nepalganj

5. Sri Ambikadevi CF, Gagretal, Jarbuta, Surkhet

1. Community Forest Registered on: 1996
2. Operational Plan renewed on: 2001
3. Area of the C.F.: 138 ha.
4. No. of Households: 72
5. NTFP management provision in OP: Not included
6. Major NTFPs in the forest: Kurilo, Pakhanbet, Harro, Barro, Ritha, Bans, etc.
7. NTFP promotion activities:

- Conservation of forest and NTFP species through control on grazing, fire and encroachment.
- Guarding system: Employment of a CF Guard @ Rs. 1000/month.
- No nursery yet established.
- Income generation activity: Nothing yet initiated.
- Training/Capacity building: Not yet provided.

6. Jagriti CF, Birendranagar-11, Surkhet:

1. Community Forest Registered on: 1997
2. Operational Plan renewed on: 2001
3. Area of the C.F.: 50ha.
4. No. of Households: 42
5. NTFP management provision in OP: Not included
6. Major NTFPs in the forest: Kurilo, Harro, Barro, Amala, Gurjo, Ritha, Bans, etc.
7. NTFP promotion activities:
   - Conservation of forest and NTFP species through control on grazing, fire and encroachment.
   - Guarding system: Employment of a CF Guard @ Rs. 1000/month.
   - No nursery yet established.
   - Income generation activity: Nothing yet initiated.
   - Training/Capacity building: Not yet provided.

7. Radha Krishna Mahila CF, Gularia, Bardiya:

1. Community Forest Registered on: 1998
2. Area of the C.F.: 5 ha.
3. No. of Households: 29
4. NTFP management provision in OP: Not included
5. Major NTFPs in the forest: Pipla, Kurilo, Harro, Barro, Amala, Sikakai, Gurjo, etc.

6. NTFP promotion activities:
   - Conservation of forest and NTFP species through control on grazing and fire.
   - No formal guarding system
   - No nursery yet established.
   - Income generation activities: Last year **50 kg** Pipla has been collected but are not able to sell due to legal barriers.
   - Training/Capacity building: 9-days' training on NTFP conservation, management, cultivation and marketing has been provided this year.
   - Training provided by: DFO, Bardiya

8. Belapur Tharu CF, Gularia, Bardiya:

1. Community Forest Registered on: 1992
2. Operational Plan renewed on: 1998
3. Area of the C.F.: 62.94 ha.
4. No. of Households:43
5. NTFP management provision in OP:Not included
6. Major NTFPs in the forest: Pipla, Kurilo, Sarpagandha, Bet, Harro, Barro, Sissoo, etc.
7. NTFP promotion activities:
   - Conservation of forest and NTFP species through control on grazing, fire and encroachment.
   - No formal guarding system
   - No nursery yet established.
   - No income generation activity initiated.
   - Training/Capacity building:9-days' training on conservation and management of Bet provided this year.
   - Training provided by: BSP-New ERA/Ban Udhyam.

Annex 7

Community Forest visited in Far Western Region of Nepal

1. Sati Karnali CF, Sati, Narayanpur, Kailali district.

1. Community Forest Registered on: 1994
2. Operation Plan Renewed on: 1999
3. Area of the C.F.: 298.25ha.
4. No. of Households:211
5. NTFP management provision in OP:Included
6. Major NTFPs in the forest: Major part of the CF includes marshy land. Therefore Bet the major NTFP with few others like Pipla, Kurilo, Sikakai, Harro, Barro, Amala, Tendu, Khair, Musli, Bel, Rohini, etc.
7. NTFP promotion activities:

- Conservation of forest and NTFP species through control on grazing, fire, encroachment, and enrichment plantation.
- About 500 seedlings of Khair, Sissoo and Siris have been planted in the CF.
- Establishment of a NTFP nursery: It includes a bet nursery covering about 1 ha. of land
- NTFP management: Medicinal plant species like Pipla, Sikakai and Kurilo are conserved. Bet is managed through rotational harvesting, the whole bet-rich forest area have been divided into 6 sections. Two sections have been set aside for experimental and conservation purposes while in the remaining 4 plots a system of rotational harvesting has been adopted, harvesting from only one plot each year.
- Income generation activities: Based on the Operation Plan, every year 1,00,000 kg of Bet is harvested for sale.
  Current market price of dry cane is Rs. 37/kg.
  Bet fruits are sole @Rs. 400/kg
  Bet seedlings are sold @Rs. 5/seedling.
- Training/Capacity building: A 10-day training on Rattan conservation and management was provided by Chhote Lal Chaudhari, CARE-Nepal during the preparation of Operation Plan in 2051.

2. Tengnuwa Mahila CF, Sukhhas, Ghodaghodi, Kailali district:

1. Community Forest Registered on: 1996
2. Operation Plan Renewed on: 2001
3. Area of the C.F.: 30ha.
4. No. of Households:45
5. NTFP management provision in OP:Not included
6. Major NTFPs in the forest: Kurilo, Pipla, Harro, Barro, Amala, Kauso, Sikakai, Khair, Rohini
7. NTFP promotion activities:

- Conservation of forest and NTFP species, control on grazing and fire, and enrichment plantation.
- No formal guard employed; community guarding system
- Establishment of a NTFP nursery is underway
- Income generation activities: not yet started
- NTFP Cultivation in the CF: Recently 2500 Bet seedlings have been planted in the CF.
- Training/Capacity building: None of the CFUG member has so far been given any form of training

3. Batabaran CF, Jhalari, Kanchanpur

1. Community Forest Registered on: 2001
2. Area of the C.F.: 149.7 ha.
3. No. of Households:515
4. NTFP management provision in OP: Not included
5. Major NTFPs in the forest: Pipla, Kurilo, Harro, Barro, Amala, Tendu, Khair, Musli, Bel, Kauso, Rohini, Mahuwa, etc.
6. NTFP promotion activities:
   - Conservation of forest and NTFP species through control on grazing and fire, and enrichment plantation.
   - The CFUG members are very active in the conservation and management fo the CF.
   - Establishment of a NTFP nursery for Bamboo, sisso and Kimbu seedling production
   - Extensive plantation of bamboo, sisso and Kimbu has been done and is continued.

- Training/Capacity building: A week's training on Forest Management provided to the CFUG members.
- Training provided by: District Forest Office, Kanchanpur
- Award: This CF has recently been awarded with Rs. 1,00,000 by the Forum of Environmental Journalist for the efficient management of the CF.

4. Baitada CF, Baitada, Daiji, Kanchanpur:

1. Community Forest Registered on: 1997
2. Area of the C.F.: 300 ha.
3. No. of Households:119
4. NTFP management provision in OP: Included
5. Major NTFPs in the forest: Kurilo, Harro, Barro, Amala, Mahuwa, Pipla, Tendu, Khair, Musli, Bel, Kauso, Rohini, etc.
6. NTFP promotion activities:
   - Conservation of forest and NTFP species through control on grazing and fire, and enrichment plantation.
   - Under the influence of HPPCL, some exotic medicinal plants like Citronella, Mentha and Palmarosa have been planted in the CF area.
   - The CF has planned to plant about 15000 seedlings of bamboo and 10-15 ha. of land with Babiyo next year.
   - Training/Capacity building: A 5-days' training on NTFP conservation and management provided
   - Training provided by:Ban Udhyam, Nepalganj

5. Shreekrishna CF, Kaluwapur, Kanchanpur:

1. Community Forest Registered on: 2001
2. Area of the C.F:110 ha.
3. No. of Households:90
4. NTFP management provision in OP:Included
5. Major NTFPs in the forest: Kurilo, Amala, Pipla, Harro, Barro, Tendu, Khair, Musli, Bel, Kauso, Rohini, Mahuwa, etc.
6. NTFP promotion activities:

- Conservation of forest and NTFP species through control on grazing and fire, and enrichment plantation.
- Employment of a CF Guard @1000/month
- Establishment of a NTFP nursery: Planned for the next year for enrichment plantation and to distribute among the interested CFUG members
- Income generation activities: Not yet initiated
- Training/Capacity building: Not yet provided.

Annex 8

Conservation Status of NTFPs by CFUGs in the study districts and suggested actions for Improvement

SN	District	Development Region	CFUG	Species Under Conservation		Suggestions for Improvemment	Remarks
				In-*situ*	Ex-*situ*		
1	Sunsari	Eastern	Shantinagar	*Cympobogon winterianus*	*Cympobogon winterianus*	1. Provide trainings and workshops	Area= 200ha
			CFUG, Itahari-2	*Terminalia chebula*	*Sapindus mukorossi*	on NTFP's cultivation/management	HH Nos.= 1370
				Terminalia bellirica		2. Control Banmara (*Eupsatorium* sp),	
				Cassia fistula		a weed and encourage users to cultivate citronella	
						Establish local small processing unit for value addition	
						Establish demonstration plot to exhibit the success of	
						NTFPs cultivation/management.	
2	Tehrathum		Chaite CFUG,	*Daphne* sp.	*Swertia chirayita*	Control collection from eroded and landslide areas.	Area= 226.38 ha
			Basantpur-3	*Girardina diversifolia*		Ban on grazing in CF areas.	HH Nos.= 248
				Drepanostachyum sp		Simplify the quarantine process for exporting NTFPs	Processing of Argeli@
				Edgeworthia gardneri		Provide soft loan to NTFP cultivators	500kg/year
				Swertia chirayita		Provide reasonable price to NTFP cultivators	
						Establish local small processing unit for value addition	
3	Dhankuta		Dumresanne	*Pinus roxburghii,*	*Cympobogon winterianus*	Distribute seedlings, saplings and seeds of the species	
			CFUG, Belahara- 2	*Bambusa* sp.	*Mentha arvensis*	that give immediate production and good market price.	
				Dendrocalamus sp	*Cympobogon martini,*	Knowledge transfer through training and	
				Thysanolaena maxima	*Pinus roxburghii*	workshops on NTFP cultivation and management	
					Bambusa sp.	Initiate plantation activities in watersheds and open	
					Thysanolaena maxima	forests.	
						Create income generation activities for rural poors.	
4	Udaypur		Chappan CFUG,	*Terminalia chebula*	*Cinnamomum tamala*	Control on timber smugglers and illegal encroachment.	Area= 1105 ha
			Triyuga- 2	*Terminalia bellirica*	*Asparagus racemosus*	Ban on grazing in CF areas and control of river floods.	HH Nos.= 881

				Asparagus racemosus	*Phyllanthus emblica*	Conduct forest inventory and silvicultural operations	
				Phyllanthus emblica	*Thysanolaena maxima*	regularly.	
				Sapindus mukorossi		Provide soft loan to NTFP cultivators	
				Bauhinia vahlii		Knowledge transfer through training and	
				Shorea robusta		workshops on NTFP cultivation and management	
				Cinnamomum tamala		Conduct NTFP extension activities to diversify income	
				Bambusa sp.		sources for rural livelihoods.	
				Dendrocalamus sp.			
				Thysanolaena maxima			
5	Rautahat	Central	Jagriti Mahila	*Terminalia chebula*		Ban on grazing in CF areas and control of river floods.	Area= 27 ha
			CFUG, Pourahi-4	*Terminalia bellirica*		Inventory of CF, thinning, pruning and selective lopping.	HH Nos.= 99
				Asparagus racemosus		Knowledge transfer through training and	
				Aathingare		workshops on NTFP cultivation and management	
						Distribute seedlings, saplings and seeds of the species	
						that give immediate production and good market price.	
6	Sarlahi		Radhakrishna	*Terminalia chebula*	*Azadiracta indica*	Ban on grazing in CF areas and control of river floods.	Area= 49 ha
			CFUG, Lalbandi	*Terminalia bellirica*	*Phyllanthus emblica*	CF Inventory and regular silvicultural operations	HH Nos.= 126
				Cassia fistula		Knowledge transfer through training and	
				Rauvolfia serpentina		workshops on NTFP cultivation and management	
				Piuper longum		Encourage local farmer s to cultivate NTFPs and	
				Azadiracta indica		support them for effective NTFPs management.	
				Kuju			
				Bombax ceiba			
				Phyllanthus emblica			
				Cinnamomum tamala			
7	Mahottari		Simbhu CFUG	*Asparagus racemosus*		Ban on grazing in CF areas and control of river floods.	Area= 300 ha
			Khayarmara-1	*Terminalia chebula*		CF Inventory and regular silvicultural operations	
				Terminalia bellirica		Knowledge transfer through training and	
				Bombax ceiba		workshops on NTFP cultivation and management	
				Swertia			

				chirayita			
				Cassia fistula			
				Makai Jara			
8	Chitwan		Kalika CFUG,	*Thysanolaena maxima*		Identification of NTFPs	Area= 290 ha
			Birendranagar,	*Asparagus racemosus*		Knowledge transfer through training and	
			Khirahai	*Terminalia chebula*		workshops on NTFP cultivation and management	
				Terminalia bellirica		Information flow on marketing channels	
				Aesandra butyracea			
				Bambusa/Dendrocalamus sp.			
				Phyllanthus emblica			
				Sapindus mukorossi			
				Piper longum			
9	Chitwan		Ageegre CF,	*Thysanolaena maxima*	Rattan (*Calamus* sp.)	Control grazing, encroachment and fire inside the CF.	Area= 290 ha
			Chinapur-1,2,3 and 6	*Asparagus racemosus*		Knowledge transfer through training and workshops on	
				Terminalia chebula		NTFP cultivation and management	
				Terminalia bellirica		Identification of NTFPs and information about	
				Sapindus mukorossi		marketing channels.	
				Bambusa/Dendrocalamus sp.			
				Phyllanthus emblica			
				Amaro			
				Phoenix dactylifera			
				Calamus sp.			
				Drepanostachyum sp.			
				Aesandra butyracea			
				Piper longum			
10	Nawalparasi	Western	Dhusari CFUG,	*Thysanolaena maxima*		Knowledge transfer through training and workshops on	Area= 67.5 ha
			Rajhar-7	*Asparagus racemosus*		NTFP cultivation and management.	160 species of
				Terminalia chebula		Provide information on market channels.	NTFPs identified
				Terminalia bellirica		Control grazing and encroachment in the forest.	
				Aesandra butyracea		Establish NTFP species nursery.	
				Bambusa/Dendrocalamus sp.		Awareness campaigns on benefits of NTFPs cultivation	

				Phyllanthus emblica		and management.	
				Amaro			
				Calamus sp.			
				Drepanostachyum sp.			
				Sapindus mukorossi			
				Piper longum			
				Withania somnifera			
				Rauvolfia serpentina			
11	Rupandehi		Shivanagar CFUG,	*Thysanolaena maxima*		Identify NTFPs found naturally in the CF.	Area= 339.75 ha
			Butwol	*Asparagus racemosus*		Knowledge transfer through training and workshops on	
				Phyllanthus emblica		NTFP cultivation and management.	
				Piper longum		Provide information on market channels.	
				Rauvolfia serpentina			
12	Dang	Midwestern	Shree Mankamna Mahila	*Rauvolfia serpentina*	*Rauvolfia serpentina*	Knowledge transfer through training and workshops on	Area= 4.75 ha
			CFUG, Ghorahi- 10	*Asparagus racemosus*	*Acacia nilotica*	NTFP cultivation and management.	HH Nos.= 27
				Terminalia chebula		Enhance income generating skills from NTFP enterprise	Regular guarding
				Terminalia bellirica		enterprise.	of CF
				Sapindus mukorossi		Provide marketing information.	
				Dendrocalamus sp.			
				Acacia nilotica			
				Shorea robusta			
13	Dang		Basanta Hariyali CFUG,	*Tinospora cordifolia*	*Cinnamomum glaucescens*	Knowledge transfer through training and workshops on	Area= 270 ha
			Akabare, Ghorsing	*Cinnamomum tamala*	*Sapindus mukorossi*	NTFP cultivation and management.	HH Nos.= 145
				Rauvolfia serpentina	*Aegle marmelos*	Support for income generation activities through	
				Cinnamomum glaucescens	*Phyllanthus emblica*	NTFPs promotion.	
				Terminalia chebula		Establish NTFPs nursery and processing plants	
				Terminalia bellirica		Control grazing and encroachment.	
				Terminalia arjuna			
				Adhatoda vasica			
				Sapindus mukorossi			

				Phyllanthus emblica			
				Aegle marmelos			
				Aesandra butyracea			
				Cassia fistula			
				Zanthxylum armatum			
14	Banke		Jalandhara CFUG,	*Piper longum*	*Piper longum*	Awareness campaigns on benefits of NTFPs cultivation	Area= 76 ha
			Mahadevpuri	*Asparagus racemosus*	*Asparagus racemosus*	and management.	HH Nos.= 82
				Terminalia chebula	*Rauvolfia serpentina*	Provide marketing information.	A guard is
				Terminalia bellirica	*Terminalia chebula*	Install NTFPs processing plants for value addition to	employed for the
				Phyllanthus emblica	*Terminalia bellirica*	NTFPs.	protection of CF
				Disopyrus montana	*Phyllanthus emblica*		
				Acacia catechu	*Cinnamomum glaucescens*		
				Curculigo orchioides	*Mucana pruriens*		
				Aegle marmelos	*Bambusa/Dendrocalamus sp.*		
				Mucana pruriens	*Calamus* sp.		
				Mallotus philippensis			
				Madhuca longifolia			
15	Banke		Mahila Upkar CFUG,	*Lagerstroemia parviflora*	*Asparagus racemosus*	Install NTFPs processing plants for value addition to	Area= 25.6 ha
			Pragatinagar, Kohalpur	*Rauvolfia serpentina*	*Rauvolfia serpentina*	NTFPs.	HH Nos.= 41
				Schleichera oleosa	*Melia azadiracta*	Knowledge transfer through training and workshops on	Users have
				Bauhinia vahlii	*Schleichera oleosa*	NTFP cultivation and management.	generated some
				Asparagus racemosus	*Azadiracta indica*		income through
				Acacia catechu	*Bamboos*		sale of *A. marmelos,*
				Bombax ceiba	*Calamus sp.*		fruits and leaves of
				Syzegium cuminii	*Thysanolaena maxima*		*D. montana*
				Thysanolaena maxima			Managed by committee
				Aegle marmelos			formed of women only.
				Mucana pruriens			
				Curculigo orchioides			
				Mallotus			

				philippensis			
				Madhuca longifolia			
				Disopyrus montana			
16	Surkhet		Sri Ambikadevi CFUG,	*Asparagus* sp.		Support for income generation activities through	Area= 138 ha
			Gagretal, Jarbuta	*Terminalia chebula*		NTFPs promotion.	HH Nos.= 72
				Terminalia bellirica		Knowledge transfer through training and workshops on	A guard is employed for
				Sapindus mukorossi		NTFP cultivation and management.	the protection of CF
				Bambusa/Dendrocalamus sp.		Establish NTFPs nurseries.	
						Protect from grazing and encroachment.	
17	Surkhet		Jagriti CFUG,	*Asparagus* sp.		Knowledge transfer through training and workshops on	Area= 50 ha
			Birendranagar-11	*Terminalia chebula*		NTFP cultivation and management.	HH Nos.= 42
				Terminalia bellirica		Support for income generation activities through	A guard is employed for
				Phyllanthus emblica		NTFPs promotion.	the protection of CF
				Tinospora cordifolia			
				Sapindus mukorossi			
				Bambusa/Dendrocalamus sp.			
18	Bardiya		Radha Krishna Mahila	*Piper longum*	*Dalbergia sissoo*	Construct fence around the CF.	Area= 5 ha
			CFUG. Gulariya	*Asparagus racemosus*	*Acacia catechu*	Knowledge transfer through training and workshops on	HH Nos.= 29
				Terminalia chebula	*Calamus* sp.	NTFP cultivation and management.	Managed by committee
				Terminalia bellirica	*Asparagus sp.*	Provide market informaion.	Formed of women only.
				Phyllanthus emblica	*Tectona grandis*		NTFPs management is
				Acacia rugata	Bambusa sp.		not described in the CF
				Tinospora cordifolia	*Phyllanthus emblica*		operational plan.
19	Bardiya		Belapur Tharu CFUG,	*Piper longum*		Provide market informaion.	Area= 62.94 ha
			Gulariya	*Asparagus racemosus*		Establish nursery	HH Nos.= 43
				Terminalia chebula		Create awareness	Area= 110 ha
				Terminalia bellirica			HH Nos.= 90
				Rauvolfia serpentina			NTFPs mgt. is not

				Calamus sp.			described in CF
				Dalbergia sissoo			Operational plan
20	Kailali	FarWestern	Sati Karnali CFUG, Sati, Narayanpur	*Calamus tenuis* (Rattan)	*Calamus tenuis*	Provide skills to make different items of Rattans. Install rattan processing plants	Area= 298.25 HH Nos.= 211
				Asparagus racemosus	*Asparagus racemosus*		100000 kg of rattan is
				Acacia rugata	*Acacia rugata*		harvested every year
				Terminalia chebula			from CF
				Terminalia bellirica			Most part of the CF is
				Disopyrus montana			rattan
				Acacia catechu			
				Acacia rugata			
				Phyllanthus emblica			
				Curculigo orchioides			
				Aegle marmelos			
				Mallotus phlippensis			
21	Kailali		Tengnuwa Mahila CFUG, Sukhhad, Ghodaghodi	*Asparagus racemosus*	*Calamus tenuis*	Establish nursery for NTFP species. Support for income generation activities through NTFPs promotion. Provide training on local processing of NTFPs.	Area= 30 ha HH Nos.= 45 NTFPs management is not mentioned in CF
				Piper longum			
				Terminalia chebula			
				Terminalia bellirica			
				Phyllanthus emblica			Operational Plan.
				Mucana pruriens			NEFEJ awarded
				Acacia rugata			NRs100000 (US$1350) to
				Acacia catechu			this CF for good management.
				Mallotus philippensis			
22	Kanchanpur		Batabaran CFUG, Jhalari	*Asparagus racemosus*	*Bambusa/Dendrocalamus sp.*	Provide training on nursery techniques and management of NTFPs Training on NTFP cultivation, harvesting and processing techniques.	Area= 149.7 ha HH Nos.= 515
				Piper longum	*Morus alba*		
				Terminalia chebula	*Acacia catechu*		
				Terminalia bellirica			NTFPs management is
				Phyllanthus emblica			not mentioned in CF
				Mucana pruriens			Operational Plan.

				Acacia rugata			
				Acacia catechu			
				Mallotus philippensis			
				Disopyrus montana			
				Madhuca longifolia			
				Curculigo orchioides			
23	Kanchanpur		Baitada CFUG, Baitada,	*Asparagus racemosus*	*Cympobogan winterianus,*	Control grazing, fire and encroachment	Area= 110 ha
			Daiji	*Terminalia sp.*	*Mentha arvensis,*	Perform enrichment plantation activities inside the CF	HH Nos.= 90
				Phyllanthus emblica	*Cympobogon martini,*	Provide training for NTFPs cultivation and management	NTFP management is
				Madhuca longifolia	*Bambusa* sp.	Supply seedlings of different NTFP species.	described in the CF
				Piper longum	*Dendrocalamus* sp.		Operational Plan.
				Disopyrus montana	*Eulaliopsis binnata*		
				Acacia catechu			
				Curculigo orchioides			
				Aegle marmelos			
				Mucana pruriens			
				Mallotus philippensis			
24	Kanchanpur		Shree Krishna CFUG,	*Asparagus racemosus*		Establish NTFPs nursery.	Area= 110 ha
			Kaluwapur	*Phyllanthus emblica*		Suggest means to generate additional income.	HH Nos.= 90
				Piper longum		Help identify the potential NTFP species in the CF.	Provision of NTFPs is
				Terminalia chebula		Perform regular silvicultural operations.	made in operational plan.
				Terminalia bellirica		Provide technical inputs on NTFP cultivation,	A forest guard is employed
				Disopyrus montana		management, harvesting, storage, processing and	on monthly salary basis.
				Acacia catechu		marketing.	
				Curculigo orchioides			
				Aegle marmelos			
				Mucana pruriens			
				Mallotus philippensis			
				Madhuca longifolia			

Annex 9

NTFP Collection permits issued by District Forest Offices of various Regions of Nepal

Annex9.1: NTFP collection Permitted by District Forest office in Eastern Region (Districts included: Dhankuta, Udyapur, Jhapa, Morang, Sunsari, Siraha and Saptari)

Name of NTFPs	Quantity (MetricTon)			Revenue (Rs.)		
	1999/00	2000/01	2001/02	1999/00	2000/01	2001/02
Amla	0	0	.050	0	0	100
Anya Phal	0	0	1.500	0	0	0
Ban Lasun	0	0	1.756	0	0	17560
Bel	0	0	.180	0	0	180
Bhorla Pat	0	23.200	372.000	0	11600	186000
Bis Jara	0	0	.425	0	0	2975
Bojho	0	0	.240	0	0	480
Chawo	0	12.895	16.65	0	25790	3330
Chayu	0	0	.400	0	0	400
Chiriato	0	.240	15.336	0	720	46008
Dhupi Pat	0	0	.700	0	0	1400
Indriani	0	0	1.000	0	0	8000
indriani ful ko ghata	0	0	.550	0	0	2750
Jiwanti	0	0	1.650	0	0	4950
Kaiyoo Phal	0	0	.850	0	0	850
Kantakari Phal	0	0	5.500	0	0	8250
Khair	0	67.300	351.452	0	2019	7022.22
Kurilo	3.00	.390	4.425	6000	780	8850
Lohan	0	0	11.500	0	0	57500
Majitho	6.180	.300	20.986	30900	600	41992
Nepali Dalchini	0	0	.100	0	0	2000
Pipla	2.932	.030	.931	14460	150	4655
Ritha	14.850	45.800	160.170	29700	91600	320340
Sal khoto	0	0	.098	0	0	294
Salla Khoto	0	0	299.961	0	0	899883
Sikakai	0	0	.500	0	1500	0
Sabai Grass	0	88.00	0	0	44000	0
Simal Khota	0	0	.500	0	1500	0
Satawari	0	0	2.181	0	0	10950
Sitaphal	0	7.825	12.900	0	15650	25800
Tejpat	0	0	28.090	0	0	561800
Thigure salla ko Pat	0	0	.900	0	0	1800
Timur	0	3.100	3.480	0	9300	10440
Total	**26.962**	**249.08**	**1316.961**	**81060**	**205209**	**2236559**

Annex 9.2: NTFPs collection permitted by District forest Office of Central amd Western Regions (Districts Included: Dhanusha, Sarlahi, Rautahat, Bara, Parsa, Makawanpur,Chitwan, Nawalparasi, Rupandehi and Kapilbastu)

Name of NTFPs	Quantity (Metric ton)			Revenue (Rs)		
	1999/00	2000/01	2001/02	1999/00	2000/01	2001/02
Aakdakda	0	0.6	0	0	3000	0
Amala	0.374	0.17	5.735	748	340	3278
Amriso	0.8	2.5	0	1600	5000	0
Babiyo	762.9	571.165	631.1	703700	592650	631100
Ban Lasun	0.155	0	0	1550	0	0
Barro	3.132	0	0	6246	0	0
Bhorla Leaf	10.5	12.3	3.8	5250	6150	1900
Bhorle bokra	0.5	16	19	500	16000	19000
Bilaune ko bark	47.705	53.575	14100	166650	228470	49350
Bis	0.062	0	0	434	0	0
Bispage	3.165	4.274	0.7	22155	29918	4900
Bukephool	6.765	2.82	6.93	13530	5640	13860
Chiriato	2.95	29.28	2.68	7850	87840	8040
Dalchini	50.16	57.846	14.525	1003200	1156920	290500
Daru haldi	1.25	2	0	2500	4000	0
Gobresalla simta	0	12.5	0	0	25000	0
Halik	5.64	12.053	31.8	11280	24106	63600
Harro	0.03	0.1	1.317	6	200	1634
Jhayoo	137.4	20	61.5	1374000	200000	615000
Jibanti	10.487	36.524	29.08	31461	109572	68220
karatchulti	0	1	0	0	3000	0
Khar Dhaddi	30	27	0	150	135	0
Khoto	0	17.227	14.3	0	51682	42900
Kukur Tarul	1.09	1.2	0	3270	3600	0
Kumkum Dhoop	0	0.1	0	0	400	0
Kurilo jara	101.077	184.95	76.544	202154	263944	153088
Laghupatra	0.55	0.6	0	2750	3750	0
Loothsalla	0	0.4	0.5	0	10000	7500
Majitha	17.726	13.7	31.8	35452	27400	63600
Masala	0	0	2.517	0	0	2517
Musli	0	0	31.5	0	0	157500
Pawan Bokra	1.5	18.32	80.3	7500	9160	401500
Pipla	0	0	0.55	0	0	2750
Punarjawa Bokra	0	0	1	0	0	8000
Ritha	5.388	2.1	0.075	10776	4200	150
Sal ko simta	14.55	0	0	29100	0	0
Saldhoop	0.65	0	0.24	3240	0	1200
Setakchini	0	3.4	0.9	0	17000	3900
Sikakai	31.904	9.099	15	95712	27297	45000
Sugandhawal	0.4	0	0	6000	0	0
Tiageri	0	0	5.5	0	0	11000
Tiarri	5.225	11.3	16	5225	11300	16000
Timur	4.696	1.985	0	14088	5955	0
Tukephool	0.052	0	0	104	0	0
Total	**1258.783**	**1226.088**	**15391.86**	**3768181**	**2933629**	**2695987**

Annex 9.3: NTFP collection permitted by District Forest office of Mid and Far-western Regions (included Districts: Dang, Surkhet, Banke, Bardia, Kailali and Kanchanpur)

Name of NTFPs	Quantity (MetricTon)		
	1999/00	2000/01	2001/02
Amala	0	0.8	4.601
Amalbed	0	0	4.361
Amriso	0	0	1.000
Atis	0	1	1.897
Babiyo	0	0.3	1384.900
Bhorla	0	12.7	65.4275
Bhutkesh	0	0	8.100
Bishma	0	0	0.019
Bojho	0	0	0.7848
Budani Phool	0	0	10.000
Chiraito	0	0	11.7425
Cinnamomum	0	0	0.050
Dalchini	0	0	5.678
Daruhaldi	0	0	0.200
Harro	0	0	.050
Jadibuti	0	0	0
Jhuanu	0	0	12.100
Jugargano	0	0.5	0.030
Kachour	0	0	0.500
Kakadsingi	0	0	2.1505
Kakoli jara	0	0	0.500
Kaladana	0	0	0.184
Kurilo jara	8.250	0	50.965
Kutki	0	0.16	0
Lohan	0	0	2.660
Maha	0	0	0
Mahuwa	0	0	0.098
Majitho	0	0	0.060
Masala pat	0	0	0.200
Nepali dalchini	0	0	4.827
Padamchal	0	0	0.225
Pakhanbed	0	1.1	3.8606
Pipla	0	0	0
Rassula	0	0	0
Rasulla	9.000	0	0
Ritha	0	0	104.560
Rohini	0	0	1.100
Salamdana	0	0	0.114
Salla simta	0	0	2.000
Satabar	0	0	3.798
Sikakai	0	0	30.268
Somlata	0	0	1.804
Sugandhakokila	0	0	74.6688
Tejpat	0	0	5.4665
Tendu leaf	0	0.08	30.155
Tigedi	0	4	4.250
Timur	0	38	183.3675
Total	**17.25**	**58.64**	**2018.723**

Annex 10

NTFP collection permits issued by District Forest Offices of selected districts of Nepal

Annex 10.1 NTFP collection permits issued by District Forest Office, Udyapur

NTFPs	Quantity (Metric Ton)
	058/059
Amala	.050
Ban Lasun	1.756
Bel	.180
Chiraito	7.936
Jiwanti	1.650
Kurilo	1.995
Majitha	1.845
Ritha	60.080
Sal khoto	.098
Satabari	2.181
Sikakai	.500
Simal	.500
Tejpat	27.490
Timur	.500
Total	**106.761**

Annex 10.2 NTFP collection permits issued by District Forest Office, Dhankuta

NTFPs	Quantity (Metric ton)
	058/059
Chiraita	4.075
Khair	117.378
Majitha	8.991
Ritha	2.430
Salla Khoto	299.961
Total	**432.835**

Annex 10.3 NTFP collection permits issued by District Forest Office, Morang

Name of NTFPs	Quantity (MetricTon)	Revenue (Rs)
	2001/02	2001/02
Bojho	.240	1200
Chiriato	.625	1875
Indriani	1.000	8000
Indriani ful ko ghata	.550	2750
Kurilo	1.200	2400
Lohan	.950	4750
Majitho	7.450	14900
Nepali Dalchini	.100	2000
Pipla	.901	4505
Ritha	37.580	75160
Tej bokra	.600	12000
Timur	.200	600
Total	**51.396**	**130140**

Annex 10.4 NTFP collection permits issued by District Forest Office, Sunsari

Name of NTFPs	Quantity (MetricTon)			Revenue (Rs.)		
	2000/01	2001/02	2002/03	2000/01	2001/02	2002/03
Anya Phal	0	1.500	0	0	1500	0
Bis Jara	0	.425	0	0	2975	0
Chawo	12.895	16.650	10.900	25790	33000	21800
Chayu	0	.400	0	0	400	0
Chiriato	.240	2.700	1.009	720	8100	3027
Dhupi Pat	0	.700	0	0	1400	0
Kaiyoo Phal	0	.850	0	0	850	0
Kantakari Phal	0	5.500	0	0	8250	0
Kurilo	.390	1.230	.350	780	2460	700
Lohan	0	.200	10.000	0	1000	50000
Majitho	6.180	.300	0	12360	600	0
Pangro	.050	0	.060	250	0	300
Pipla	2.932	.030	0	19660	150	0
Ritha	14.850	45.800	24.835	29700	91600	49670
Rudrakshya	0	0	4.700	0	0	0
Satawari	0	0	.050	0	0	0
Sitaphal	7.825	12.900	0	15650	25800	0
Thigure salla ko Pat	0	.900	0	0	1800	0
Timur	3.100	2.780	1.800	9300	8340	5400
Total	**48.462**	**92.865**	**53.704**	**114210**	**184225**	**130897**

*Annex 10.5 NTFP collection permits issued by District Forest Office, Siraha**

Name of NTFPs	Quantity (MetricTon)			Revenue(Rs)		
	1999/00	2000/01	2001/02	1999/00	2000/01	2001/02
Tejpat	18.620	16.700	0	186200	167000	0
Bhorla Pat	0	21.000	372.000	0	100500	186000
Sabai Grass	0	88.000	0	0	44000	0
Kurilo Jara	3.000	31.7505	0	6000	6351	0
Total	**21.620**	**157.4505**	**372.000**	**192200**	**317851**	**186000**

* Collection permitted on the basis of auction.

Annex 10.6 NTFP collection permit issued by District Forest Office, Saptari

Name of NTFPs	Quantity (MetricTon)			Revenue (Rs)		
	1999/00	2000/01	2001/02	1999/00	2000/01	2001/02
Khair	0	67.3	234.074	0	2019	7022.22
Bhorla Pat	0	2.2	0	0	1100	0
Total		**69.5**	**234.074**	**0**	**3119**	**7022.22**

Annex 10.7 NTFP collection permits issued by District Forest Office, Dhanusha

NTFPs	Quantity (Metric ton)
	2001/02
Amala	0.15
Jibanti	0.17
Kurilo	0.92
Musli	3
Sikakai	0.75
Simal	0.3
Total	**4.990**

Annex 10.8 NTFP collection permits issued by District Forest Office, Mahottari

NTFPs	Quantity (metric ton)
	2001/02
Chiraito	0.18
Pipla	0.4
Harro	0.055
Kurilo	6.2
Musli	28.5
Jibanti	0.17
Total	**35.505**

Annex 10.9 NTFP collection permitted by District Forest Office, Rautahat

Name of NTFPs	Quantity (Metric Ton)			Revenue (Rs)		
	1999/00	2000/01	2001/02	1999/00	2000/01	2001/02
Sikakai Phal	2.304	3.820	7.800	6912	11460	23400
Kurilo Jara	1.550	.350	.650	2900	700	1300
Simal Khoti	.850	.850	.800	2550	2550	2400
Amla Phal	0	.1	.850	0	200	1700
Pawan Bokra	0	0	48.0	0	0	240000
Total	**4.804**	**5.12**	**58.75**	**12362**	**14910**	**268800**

Annex 10.10 NTFP collections permitted By District Forest Office, Sarlahi

Name of NTFPs	Quantity (Metric Ton)			Revenue (Rs)		
	2000/01	2001/02	2002/03	2000/01	2001/02	2002/03
Bhorla Pat	No documentation Due to fire Casualty In 2059-1-18		.70	Record has been lost.		350
Pipla Phal			3.5			10500
Sikakai			.513			1539
Kurilo			.800			1600
Musli			.200			
Total			**5.731**			**13989**

Musli-root, Sikakai-Fruit

Annex 10.11 NTFP collection permitted by District Forest Office, Bara

Name of NTFPs	Quantity (MetricTon)			Revenue (Rs)		
	1999/00	2000/01	2001/02	1999/00	2000/01	2001/02
Bhorla ko Pat	10.500	12.300	3.800	5250	6150	1900
Khar Dhaddi	30	27	0	150	135	0
Bankas babiyo	118.4	5.250	0	59200	26250	0
Kurilo Jara	.200	.853	0	400	1706.4	0
Sikakai Phal	0	2.879	0	0	8637	0
Pawan Bokra	0	0	24	0	0	120000
Punarjawa Bokra	0	0	1	0	0	8000
Total	**159.1**	**48.28202**	**28.8**	**65000**	**42878.4**	**129900**
Khair	0	1185.44cft*	0	0	357000	0

* Khair has been sold in cubic feet basis for purpose of Katha.

Annex 10.12 NTFP collection permitted by District Forest Office, Parsa

Name of NTFPs	Quantity (MetricTon)			Revenue (Rs)		
	1999/00	2000/01	2001/02	1999/00	2000/01	2001/02
Kurilo Jara	6.000	0	0	12000	0	0
Bhorla bokra	0	16.000	14.00	0	8000	12500
Pawan Bokra	0	14.00	0.2	0	70000	1000
Total	**3.1**	**30**	**23.2**	**12000**	**78000**	**13500**

Annex 10.13 NTFP collection permitted by the District Forest Office, Makwanpur

Name of NTFPs	Quantity (Metric Ton)			Revenue (Rs)		
	1999/00	2000/01	2001/02	1999/00	2000/01	2001/02
Aakdakda	0	0.600	0	0	3000	0
Amala	0.200	0.070	1.300	400	140	2600
Ban Lasun	0.155	0	0	1550	0	0
Barro	0	0.300	0	0	600	0
Bhorla ko bokra	0.500	0	5.000	500	0	5000
Bis	0.062	0	0	434	0	0
Bisfej	3.165	4.274	0.700	22155	29918	4900
Bukephool	6.765	2.820	6.930	13530	5640	13860
Chiriato	2.800	29.280	2.500	7400	87840	7500
Dalchini	0.101	0.300	0	2020	6000	0
Daru haldi	1.250	2.000	0	2500	4000	0
Gobresalla simta	0	12.500	0	0	25000	0
Halik	5.640	12.053	31.800	11280	24106	63600
Harro	0	0.100	0	0	200	0
Jhayoo	137.400	20.000	61.500	1374000	200000	615000
Jibantii	10.487	36.524	18.340	31461	109572	55020
Karatchulti	0	1.000	0	0	3000	0
Khoto	0	17.227	14.000	0	51682.5	42000
Kukur Tarul	1.090	1.200	0	3270	3600	0
Kumkum Dhoop	0	0.100	0	0	400	0
Kurilo Jara	80.963	74.954	54.915	161926	149908	109830
Laghupatra	0.550	0.200	0	2750	1000	0
Loothsalla	0	0.400	0.500	0	10000	7500
Majitha	17.726	13.700	31.800	35452	27400	63600
Masala	0	0	2.517	0	0	2517
Pawan Bokra	1.500	4.320	3.600	7500	21600	18000
Ritha	1.920	2.100	0.075	3840	4200	150
Sal ko simta	14.550	0	0	29100	0	0
Sal dhoop	0.650	0	0.240	3250		1200
Setakchini	0	3.400	0.700	0	17000	3500
Sikakai	5.800	2.400	1.450	17400	7200	4350
Sugandhawal	0.400	0	0	6000	0	0
Tigedi	0	0	5.500	0	0	11000
Tiarri	5.225	11.300	16.000	5225	11300	16000
Timur	0.424	0	0	1272	0	0
Tukephool	0.052	0	0	104	0	0
Total	**299.375**	**253.322**	**259.367**	**1744319**	**805306.5**	**1047127**

Annex 10.14 NTFP collection permits issued by District Forest Office, Chitwan

NTFPs	Quantity (Metric ton)			Revenue (Rs)		
	1999/00	2000/01	2001/02	1999/00	2000/01	2001/02
Amla	0.174	0	0.339	348	0	678
Barro	2.823	0	3.523	5646	0	7046
Chiriato	0.125	0	0	375	0	0
Gurjoo	1.8725	0	3.765	9362.5	0	18825
Harro	0.003	0	1.262	6	0	1524
Jiwanti	0	0	10.400	0	0	31200
Kurilo	11.4	0	12.45	22800	0	24900
Pawan bokra	0	0	4.5	0	0	22500
Ritha	0	0	0.5	0	0	1000
Setekchini	0	0	0.2	0	0	400
Sikakai	0	0	5	0	0	15000
Total	**16.3975**	**0**	**41.939**	**38537.5**	**0**	**123073**

Annex 10.15 NTFP collection permits issued by District Forest Office, Nawalparasi

NTFPs	Quantity (metric ton)							
	1994/95	1995/96	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02
Belauni	0	0	0.5	0.843	0.6	1.6	1.12	0
Dalchini	10.45	9.35	4.25	1.225	0.9	3.543	2.73	0
Kurilo	0	0	0	19.107	28.2	25	22.4	0
Ritha	0	2.598	0.65	0	0	0.988	0	0
Satawari	36.033	11.46	8.815	7.3	0	0	0	0
Sikakai	1.705	3.4	32	14.296	18	23.8	19.8	6.2
Pipla	0	0	0	0	0	0	0	0.15
Total	**48.188**	**26.808**	**46.215**	**42.771**	**47.700**	**54.931**	**46.050**	**6.35**

Annex 10.16 NTFP collection permits issued by District Forest Office, Rupandehi

NTFPs	Quantity (metric ton)			Revenue (Rs)		
	1999/00	2000/01	2001/02	1999/00	2000/01	2001/02
Amriso	0.8	2.5	0	1600	5000	0
Bilaune	46.105	52.455	14.1	161050	224550	49350
Chiriato	0.025	0	0	75	0	0
Dalchini	46.516	54.816	14.525	930320	1096700	290500
Kurilo	2.221	2.3	0.609	4442	4600	1218
Pipla	0.04	0	0	200	0	0
Ritha	2.480	0	0	4960	0	0
Timur	4.272	1.985	0	12816	5955	0
Total	**102.459**	**114.056**	**29.234**	**1115463**	**1336805**	**341068**

Annex 10.17 NTFP collection permits issued by District Forest Office, Kapilbastu

NTFPs	Quantity (Metric Ton)			Revenue (Rs)		
	1999/00	2000/01	2001/02	1999/00	2000/01	2001/02
Babiyo	644.5	566.4	631.1	644500	566400	631100
Bojho	0.2	0	0	400	0	0
Kurilo	0.193	0	0	386	0	0
Thakal	0	5.5	0	0	5500	0
Total	**644.893**	**571.9**	**631.1**	**645286**	**571900**	**631100**

Annex 10.18 NTFP collection permits issued by District Forest Office, Dang

NTFPs	Quantity (Metric ton)
	2001/02
Amala	3.106
Amalbed	4.276
Atis	1.897
Bhutkesh	8.100
Bishma	0.019
Bojho	0.120
Chiraito	0.3925
Dalchini	5.678
Kakadsingi	2.1305
Kakoli jara	0.500
Kaladana	0.184
Kurilo jara	14.239
Lohan	0.150
Majitho	0.060
Padamchal	0.200
Pakhanbed	0.040
Ritha	51.520
Salamdana	0.114
Satabar	1.993
Somlata	0.800
Sugandhakokila	74.6688
Tejpat	1.005
Tigedi	4.250
Timur	128.8325
Total	**2867.57.3**

Annex 10. 19 NTFP collection permits issued by District Forest Office, Nepalganj, Banke

NTFPs	Quantity (Metric ton)		
	2000/01	2001/02	Total
Amala	0.800	0	0.800
Amriso	1.000	1.000	2
Babiyo	0	1384.900	1384.900
Jugargano	0	0.030	0.030
Kurilo jara	2.300	0.400	2.700
Maha	0.300	0	0.300
Mahuwa (flower)	0.500	0.098	0.598
Pipla	0.080	0	0.080
Rohini phal	0	1.100	1.100
Satawari	0.160	0	0.160
Sikakai	12.700	30.155	42.855
Tendu leaf	0	30.155	30.155
Total	**17.840**	**1447.838**	**1465.678**

Annex 10.20 NTFP collection permits issued by District Forest Office, Surkhet

NTFPs	Quantity (Metric ton)
	2001/02
Amalbed	0.085
Bojho jara	0.250
Chiraito	11.350
Jhyau	12.100
Kakadsingi phal	0.020
Kurilo Jara	26.551
Lohan	2.510
Main	0.200
Masalapat	0.200
Nepali Dalchini	3.965
Padamchal	0.025
Ritha	29.805
Somlata	1.004
Sugandhawal Jara	4.700
Tejpat	0.100
Timur	54.535
Total	**147.400**

Annex 10.21 NTFPs collection permit issued by District Forest Office of Bardia

NTFPs	Quantity (Metric ton)		
	2000/01	1999/00	1998/99
Jadibuti	1.100	-	0
Kurilo	1.700	8.250	0
Rasulla	0	9.000	0
Sikakai	11.000	-	0
Kutki	38.000	-	0
Total	**51.8**	**17.25**	**0**

Annex 10. 22 NTFP collections Permits Issued by District Forest Office, Kailali

NTFPs	Quantity (metric ton)
	2001/02
Amala	1.495
Bhorla ko bokra	42.3275
Bojho	0.4148
Daruhaldi	0.200
Harro	0.050
Kachur Jara	0.500
Kurilo Jara	1.525
Nepali Dalchini	0.812
Pakhanbed Jara	3.8206
Ritha	23.235
Salla ko simta	2.000
Satawari Jara	1.805
Sikakai	0.113
Tejpat	4.3615
Total	**82.6594**

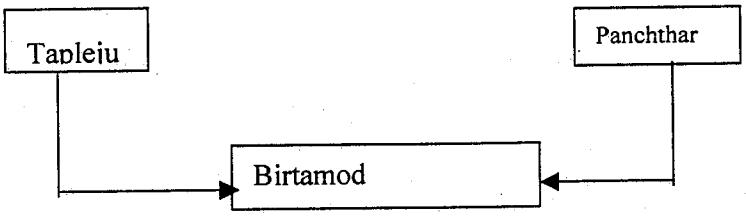
Annex 10. 23 NTFP Collection Permit Issued by DFO, Kanchanpur-2001/02

SN	NTFPs	Quantity (metricton)	Revenue (Rs.)
1.	Vorla Leaf	23.100	23,900.00
2.	Nepali Dalchini	0.050	1,000.00
3.	Budhani Phool	10.000	20,000.00
4.	Cinnamon leaf	0.050	500.00
Total		**33.2**	**45,400.00**

Annex 11

NTFP Information based on trade center/traders

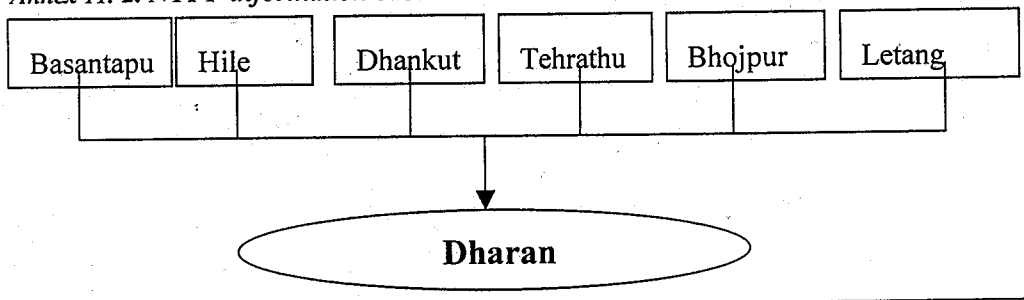
Annex 11.1. NTFP Information based on trade Center/traders: Birtamod, Jhapa



Major NTFPs In trade	Average quantity (Metric ton) traded in Year (2000/01)	Buying price (Rs.)
Chiraito	6.5	100-150
Kurilo Jara	1.2	100-150
Timur	2	50-60
Pawan Bark	5	70-80
Sikakai	2	40-55
Tejpat	7	20-25

Pakaging cost of these NTFps @ Rs20/ 50 kg bundle.

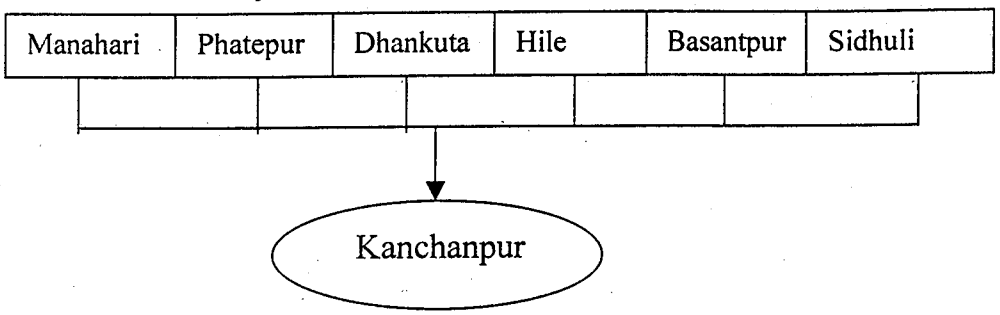
Annex 11. 2. NTFP information based on Trade Center/Traders: Dharan, Sunsari



Major NTFPs In trade	Average quantity (Metric ton) traded in Year (2000/01)	Buying price (Rs)
Chiraito	20-50	100-120
Ritha	400	12-15
Majitho	5	28-30
Dalchini	4	20
Sutho	140	15-30
Tejpat	156	15-17
Kurilo Jara	5	100-120
Pipla	650	12-15
Pangra	10	30-35
Indrini ko seed	0.3	50-70

Processing cost for all NTFPs @ Rs 50/ pack or *bora* ,30% support to the livelihood of trader

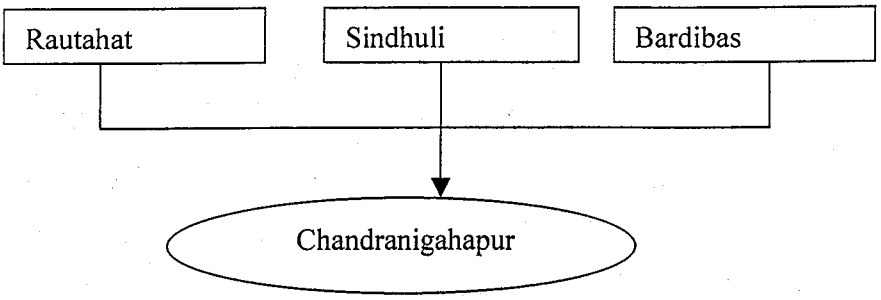
Annex 11.3. NTFP information based on trade center/traders: Kanchanpur, Saptari



Major NTFPs In trade	Average quantity (metric ton) traded in Year 2001/02	Buying price (Rs)
Sikakai	40-50	15-30
Salla Khoto	5-6	15-35
Kurilo	10	100-150
Majitho	12	28-30
Tejpat	4	25-30
Dalchini	1	40-45
Pipla	2	15-30
Nirmasi	1	300-400

Processing cost @ Rs 50/ Bora, 70% support to livelihood.

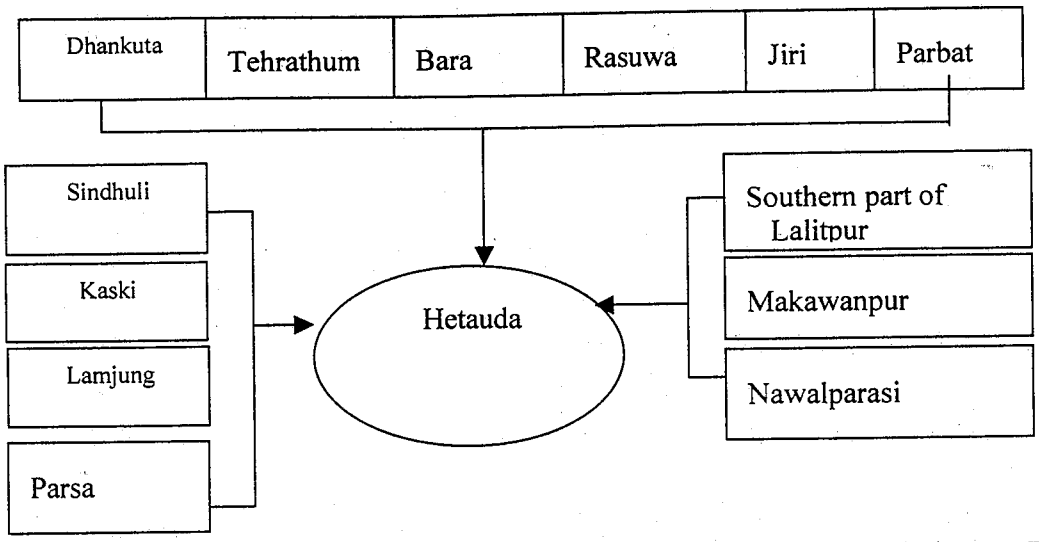
Annex 11. 4. NTFP information based on trade center/traders: Chandranigahapur, Rautahat.



Major NTFPs In trade	Average quantity (metric ton) traded in Year (2001/02)	Buying price (Rs)
Sikakai	10	20-30
Kurilo	5	100-150
Pipla	1	15-20

Processinr cost @ 50\ Bora
3% support to the Livelihood.

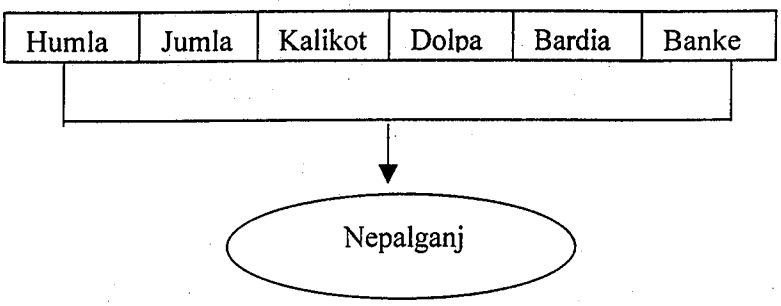
Annex 11. 5. NTFP information based on trade center/traders: Hetauda, Makawanpur district



Major NTFPs in Trade	Average Quantity (metric ton)in Year (2001/02)	Buying price (Rs)
Kurilo	38	100-150
Jhyau	68	100-160
Amala	9	70-80
Harro	2	40
Musli	5	15
Chiraito	26	120
Jiwanti	11	70-80
Majitho	35	15-20
Halik	15	27-28
Bojho	1	20-30
Jatamasi	8	40
Tigadi	10	100-120
Kakuli	1.2	60
Simal Khoto	1.4	185-200
Bikh	0.4	20-30
Ban Lasun	0.5	70-75
Nepali Musali	0.03	30-35

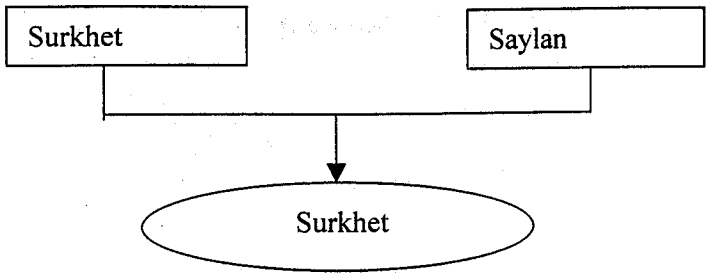
50% support to the livelihood
Processing and packaging cost @ Rs 5/kg

Annex 11.6. NTFP information based on trade center/traders: Nepalganj, Banke district



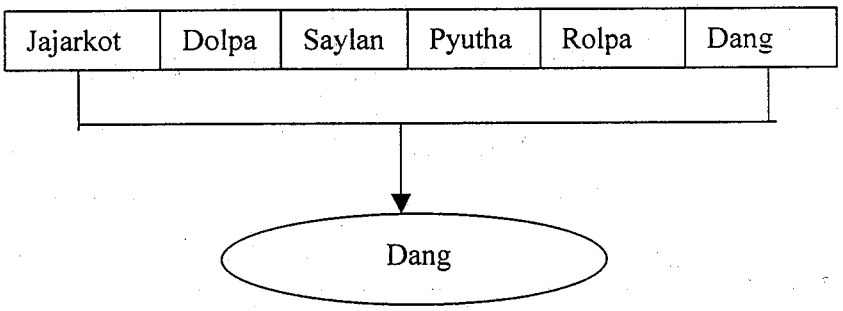
Major NTFPs In trade	Average quantity traded in Year (2001/02)	Buying price (Rs)
Amala	25-30000	28-30
Amalved	35000	70-75
Atis	6--7000	180-200
Barro	12-15000	9--10
Bhorla (Bark)	25-30000	10--12
Bhutkesh	80-85000	65-70
Bikh	20-2200	100-120
Bikhma	30-3200	110-120
Bojho	10-12000	24-28
Budhani	350-400000	50-55
Chiraito	30-32000	160-180
Chulthi	4--5000	65-70
Dalchini	28-30000	30-35
Daruhaldi	2000	140-150
Dhupi	30-35000	25-35
Dhupjadi	80-85000	70-75
Gucchi chyau	3800-4000	4000-4200
Harro	6--8000	11--12
Jatamasi	180-200000	130-140
Jiwanti	10--11000	40-45
Kakadsingi	7--8000	150-200
Kakoli	12--1500	70-75
Kurilo	60-65000	160
Kutki	55-60000	160
Majitho	5--6000	25-30
Musli	9--10000	40-42
Nirmasi	500-800	250-130
Okhar bokra	2000-2200	125-130
Padamchal	9--10000	40-45
Pakhanbet	22-24000	14-15
Panchaunle	800-1000	1000-1200
Pipla	35-40000	110-130
Ritha	300-320000	12--14
Salamdana	10000	90-110
Satuwa	4--5000	160
Sikakai	80-85000	13-15
Somlata	15-16000	40-45
Sugandhawala	80-100000	150
Sugandhakokila	60-70000	65-75
Tejpat	80-90000	12--14
Tigedi	3000	60-70
Timur	140-145000	70-75

Annex 11.7. NTFP information based on trade centre/traders, Surkhet district



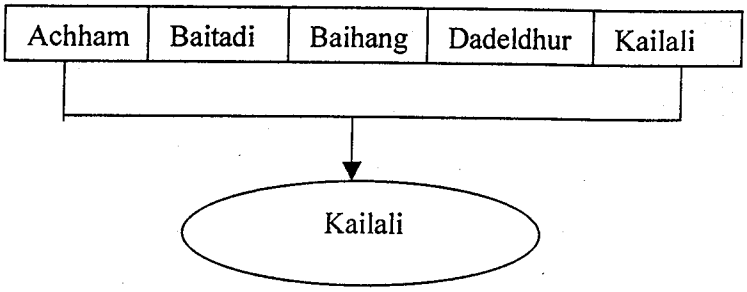
Major NTFPs In trade	Average quantity (metric ton) traded in Year (2001/02)	Buying price (Rs)
Bojho	6.000	15-18
Dalchini	7.000	20-25
Kurilo	20.000	130-140
Pakhanbed	32.00	5--6
Ritha	21.000	7--8
Samayo	36.00	50-55
Tejpat	22.00	10--11
Timur	23.000	60-65
Total	**167**	

Annex 11. 8. NTFP information based on trade centre/traders: Dang district.



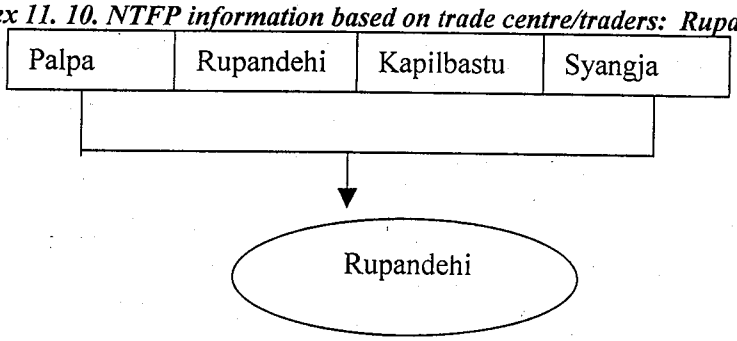
Major NTFPs in trade	Average quantity Traded (Metric ton) in year (2001/02)	Buying price (Rs)
Amalbet	1.000	
Chiraito	3.000	200
Dalchini	10.000	20
Kurilo	26.000	135
Ritha	100.800	9
Sugandhakokila	10.400	65
Sugandhawal	1.500	80
Timur	2750.000	90
Total	**2902.7**	

Annex 11.9. NTFP information based on trade centre/traders: Kailali district



Major NTFPs In trade	Average quantity Traded (2001/02)	Buying price (Rs)
Bojho	5000	15-20
Chutro	2000	140
Dalchini	8000	45-50
Majitho	300	50-55
Pakhanbed	2000	12-14
Ritha	8500	10
Samayo	8500	80-85
Tejpat	18000	18-22
Total	**52300**	

Annex 11. 10. NTFP information based on trade centre/traders: Rupandehi district



Major NTFPs in Trade	Average Quantity (Metric ton) in year (2001/02)	Buying Price
Dalchini	14	30-35
Kurilo	4	130-150
Timur	4	60-70
Bilauni Bark	0.7	30-40

Annex 12

Gross Margin Analysis of some of the high value NTFPs

Annex 12.1 Pamarosa (Cymbopogan martini) Cost benefit analysis per hectare (Four Year Crop)

S. No.	Description	Quantity	No. of labor	Per unit cost (NRs)	Total NRs
					Year 1
1.	Land preparation		25	60	1500
2.	Seed	2 kg		200	400
3.	Nursery management				
4.	Compost	10 tons		300	3000
5.	Seedlings transplanting		32	60	1920
6.	Weeding hoeing		18	60	1080
7.	Irrigation				500
8.	Harvesting		25	60	1500
9.	Processing				3750
					Total 14130
					Expenditure during year 2, 3 & 4
1.	Compost	5 tons		300	1500
2.	Weeding		25	60	1500
3.	Irrigation				1500
4.	Harvesting		38	60	2280
5.	Processing				6250
					Total 13030
6.	Total expenditure in year 2, 3, and 4				39090
7.	Total production cost for four year (39090 + 14130)				53220
8.	Total oil production in four year 250 kg				
9.	Total return from sales of oil (250 kg @ NRs500 per Kg)				125000
10.	Gross profit in four year				71780
11.	Average profit per year				17945

(Source: Bhattari 2001, HPPCL 2002, Parajuli 2001(b).

Annex 12.2 Lemongrass (Cymbopogan flexuosus) Cost benefit analysis per hectare (Four Year Crop)

S. No.	Description	Quantity	No. of labour	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.	Seedlings 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 year (42300 + 15250)				57550
8.	Total oil production in four year 315 kg				
9.	Total return from sales of oil (315 kg @ NRs 400 per Kg)				126000
10.	Gross profit in four year				68450
11.	Average profit per year				17112.5

(Source: Bhattari 2001, HPPCL 2002, Parajuli 2001(b).

Annex 12.3 Citronella (Cymbopogan winterianus) Cost benefit analysis per hectare (Four Year Crop)

S. No.	Description	Quantity	No. of labour	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.	Seedlings 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		30	60	1800
5.	Processing				6250
					Total 12550
6.	Total expenditure in year 2, 3, and 4				37650
7.	Total production cost for four year (37650 + 12550)				52900
8.	Total oil production in four year 600 kg				
9.	Total return from sales of oil (600 kg @ NRs 200 per Kg)				120000
10.	Gross profit in four year				67100
11.	Average profit per year				16775

(Source: Bhattari 2001, HPPCL 2002, Parajuli 2001b)

Annex 12.4 Chamomille (Matricaria chamomilla) Cost benefit analysis per hectare (Seasonal Crop)

S. No.	Description	No. of labor/ plough	Per unit cost (Rs)	Total Rs
1.	Land preparation by bullock plough)	15 plough	100	1500
2.	Land preparation by labour	15	60	900
3.	Seed	1 Kg	270	270
4.	Compost	10 tons	300	3000
5.	Compost application and leveling of field by labour	25	60	1500
6.	Seed sowing by labour	10	60	600
7.	Weeding hoeing	50	60	3000
8.	Harvesting	40	60	2400
9.	Processing 500 kg per batch per vessel processing cost	5	400	2000
10.	Total production cost			15170
11.	Total oil production 6Kg		6000	36000
			Net profit (36000-15170)	20830

(Source: Bhattari 2001, HPPCL 2002, Parajuli 2001 (b).

Annex 12.5 Japanese mint (Mentha arvensis) Cost benefit analysis per hectare (Seasonal Crop)

S. No.	Description	Quantity	No. of labor	Per unit cost (NRs)	Total NRs
					First cutting
1.	Land preparation		35	60	2100
2.	Seedlings/suckers	350 kg		2	700
3.	Compost	10 tons		300	3000
4.	Suckers 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)				23400
7.	Total oil production in two cuttings 100kg				
9.	Total return from sales of oil (100Kg @ 500 per Kg)				50000
10.	Net profit (50000-23400)				26600

(Source: Bhattari 2001, HPPCL 2002, Parajuli 2001 (b).

Annex 12.6 French basil (Ocimum basilicum) Cost benefit analysis per hectare (Seasonal Crop)

S. No.	Description	No. of labor/ plough	Per unit cost (Rs)	Total Rs
1.	Land preparation by bullock plough)	15 plough	100	1500
2.	Land preparation by labour	20	60	1200
3.	Seed			
	Nursery bed ploughing	1 plough	100	100
	Seedbed preparation	3 labours	60	180
	Maintenance of nursery beds	6 labours	60	360
4.	Compost	5 tons	300	1500
5.	Compost application and leveling of field by labour	10 labours	60	600
6.	Seedlings planting by labour	30	60	1800
7.	Weeding hoeing	25	60	1500
8.	Harvesting	70	60	4200
9.	Processing 500 kg per batch per vessel processing cost for 15 batch	15	200	3000
10.	Total production cost			15940
11.	Total oil production 25Kg		1200	30000
		Net profit (30000-15940)		14060

(Source: Bhattari 2001, HPPCL 2002, Parajuli 2001 (b).

Annex 12.7 Satawari (Asparagus racemosus) Cost benefit analysis per hectare (Two years Crop)

S. No.	Description	No. of labor/ plough	Per unit cost (NRs)	Total NRs
1.	Land preparation by labour	20	60	1200
2.	Seed	4 kg	300	1200
	Seedbed preparation	6 labours	60	360
	Maintenance of nursery beds	24 labours	60	1440
3	Land preparation	80	60	4800
4.	Compost	10 tons	500	5000
5.	Seedlings planting by labour	60	60	3600
6.	Irrigation			200
7.	Weeding hoeing	60	60	3600
8.	Harvesting/digging roots	80	60	4800
9.	Processing	60	60	3600
	Drying and storage	50	60	3000
10.	Total production cost for 24 months			34600
11.	Total production in 24months 2500Kg		150	375000
			Net profit (375000-34600)	340400

(Source: Bhattari 2001, HPPCL 2002, Parajuli 2001 (b).

Annex 12.8 Amala (Emblica officinalis) Cost benefit analysis per hectare (Perennial Tree Four years)

Sr. No.	Description	No. of labor/ plough	Per unit cost (NRs)	Total NRs
1.	Land preparation by labour	20	60	1200
2.	Seed	4 kg	-	1000
	Nurserybed preparation	30 labours	60	1800
	Polbed preparation	20	60	1200
	Maintenance of nursery beds	60 labours	60	3600
3	Land preparation/digging pits	60	60	3600
4.	Planting by labour	40	60	2400
5.	Compost	5 tons	500	2500
				Total 17300
6.	Care and Maintainance	60	60	3600
	Weeding hoeing	30	60	1800
	Irrigation			1000
	others			2000
				Annual total 4800
				Care and maintenance for 4 years 4800 x 4 = 19200
7.	Total expenditure			41300
8.	Total production (dried)	3500 kg	30	105000
			Net profit (105000-41300)	65500

(Source: Bhattari 2001, HPPCL 2002, Parajuli 2001 (b).

Annex 12.9 Ritha (Sapindus mukorossi) Cost benefit analysis per hectare (Perennial Four years)

S. No.	Description	No. of labor/ plough	Per unit cost (NRs)	Total NRs
	Nursery			
1.	Seed	4 kg	200	800
	Land preparation	20 labours	60	1200
	Seed bed preparation	30	60	1800
	Maintenance of nursery beds	30 labours	60	1800
2.	Land preparation/digging pits	60	60	3600
3.	Planting by labour	40	60	2400
4.	Compost	5 tons	500	2500
				Total 14100
5.	Care and Maintainance			
	Weeding hoeing	30	60	1800
	Irrigation			1000
	Others			2000
				Annual total 4800
				Care and maintenance for 4 years 4800 x 4 = 19200
6.	Total expenditure for 5years			38100
7.	Total production (dried)	20000 kg	6	120000
			Net profit (120000-38100)	81900

(Source: Bhattari 2001, HPPCL 2002, Parajuli 2001 (b).

Annex 12.10 Tejpat (Cinnamomum tamala) Cost benefit analysis per hectare (Perennial Four Years Crop)

Sr. No.	Description	No. of labor/ plough	Per unit cost (Rs)	Total Rs
	Nursery			
1.	Seed	1 kg	400	400
	Land preparation	20 labours	60	1200
	Seed bed preparation	30	60	1800
	Poly bed preparation	20	60	1200
	Maintenance of nursery beds	30 labours	60	1800
2.	Land preparation/digging pits	60	60	3600
3.	Planting by labour	40	60	2400
4.	Compost	5 tons	500	2500
				Total 14900
5.	Care and Maintainance			
	Weeding hoeing	30	60	1800
	Irrigation			1000
	Others			2000
				Annual total 4800
				Care and maintenance for 4 years 4800 x 9 = 43200
6.	Total expenditure for 9 years			43200
7.	Harvesting	120	60	7200
8.	Drying and storage	40	60	2400
9.	Total expenditure for 10 years			72500
8.	Total production (dried leaf)	20000 kg	6	120000
	Total production (dried bark)	9600 kg	7	67200
			Net profit (120000 + 67200- 72500)	114700

(Source: Bhattari 2001, HPPCL 2002, Parajuli 2001 (b).

Gross Margin Analysis of the plants cultivated by farmers for HPPCL (Tarahara)

Annex 12.11 Pamarosa: Benefit and Cost Analysis (ha) Plantation Cost

S.N.	Particulars	Quantity	Labour (Men) No.	Rate (Rs.)	Total Amount
1	Land Preparation	-	25	60	1500
2	Seed	2 Kg	-	200	400
3	Nursery	-	8	60	480
4	Compost Manure	10 tons	-	300	3000
5	Transplanting	-	32	60	1920
6	Tillage	-	18	60	1080
7	Irrigation	-	-	-	500
8	Harvesting	-	25	60	1500
9	Processing	-	-	-	3750
	Total				**14,130**

Production cost [Second, Third and Fourth Year (Per year basis)]

S.N.	Particulars	Quantity	Labour (Men) No.	Rate (Rs.)	Total Amount
1.	Compost manure	5 tons	-	300	1500
2.	Tillage	-	25	60	1500
3.	Irrigation	-	-	-	1500
4.	Harvesting	-	38	60	2280
5.	Processing				6250
	Total cost				13030

6. Total Cost in Second, Third and Fourth Year	39,090
7.Total Production Cost in Four Year	53,220
8.Essential Oil manufactured 250 Kg	
9. Income (250 *500)	1,25, 000
10. Net Profit (four year)	71,800
Average annual Profit	17,945

Source: HPPCL

Annex 12.12. Lemon Grass: Benefit and Cost Analysis (ha) Plantation Cost

S.N.	Particulars	Quantity	Labour (Men) No.	Rate (Rs.)	Total Amount
1	Land Preparation	-	25	60	1500
2	Plants	25000	--	.10	2500
3	Compost Manure	10 tons	--	300	3000
4	Transplanting	--	32	60	1920
5	Tillage	--	18	60	1080
6	Irrigation	--	--	--	--
7	Harvesting	--	25	60	1500
8	Processing	--	--	--	3750
	Total				**15250**

Production Cost [Second, Third and Fourth Year (Per Year basis)]

S.N.	Particulars	Quantity	Labour No. (Men)	Rate (Rs.)	Total Amount
1.	Compost manure	5 ton	-	300	1500
2.	Tillage	-	25	60	1500
3.	Irrigation	-	-	-	1500
4.	Harvesting	-	35	60	2100
5.	Processing				7500
	Total				**14100**

6. Total Cost in Second, Third and Fourth Year	42,300
7.Total Production Cost in Four Year	57,550
8.Essential Oil manufactured 315 Kg	
9. Income (315 *400)	1,26,000
10. Net Profit (four year)	68,450
Average annual Profit	17,112.50

Annex 12.13. Citronella: Benefit and Cost Analysis (Ha) Plantation Cost

S.N.	Particulars	Quantity	Labour No. (Men)	Rate (Rs.)	Total Amount
1	Land Preparation	-	30	50	1500
2	Slip	2500	-	1	2500
3	Compost Manure	10 ton	-	300	3000
4	Transplanting	-	32	60	1920
5	Tillage	-	18	60	1080
6	Irrigation	-	-	-	500
7	Harvesting	-	25	60	1500
8	Processing	-	-	-	3750
	Total				**15250**

Production Cost [(Second, Third and Fourth Year (Per year basis)]

S.N.	Particulars	Quantity	Labour No. (Men)	Rate (Rs.)	Total Amount
1.	Compost manure	5 tons	-	300	1500
2.	Tillage	-	25	60	1500
3.	Irrigation	-	-	-	1500
4.	Harvesting	-	30	60	1800
5.	Processing				6200
	Total				**12550**

6. Total Cost in Second, Third and Fourth Year	Rs. 37,650
7.Total Production Cost in Four Year	Rs.52, 900
8.Essential Oil manufactured 600 Kg	
9. Income (600 *200)	Rs. 1,20,000
10. Net Profit (four year)	Rs. 67,100
Average annual Profit	Rs. 16,775

Annex 12.14. Chamomille (Matricaria Chamomilla) (Annual Rotational Crop): Benefit and Cost Analysis (Ha) **Plantation Cost**

S.N.	Particulars	Quantity	Labour No. (Men)	Rate (Rs.)	Total Amount
1	Land Preparation	-	30	80	2400
2	Seed	1 kg	-	270	270
3	Compost Manure	10 tons	-	300	3000
4	Manure/Seed broadcasting	-	35	60	2100
5	Tillage	-	25	60	1500
6	Irrigation	-	-	-	1500
7	Harvesting	-	40	60	2400
8	Processing*	-	5	400	2000
	Total				**15,170**

* Processing is done on the basis of 500 kg per batch (5 vessel)

Total production Cost = Rs.15,170
Income by manufacture of essential oil (6 kg* 6000) = Rs.36000
Net benefit = Rs.20, 830

Annex 12.15. Mentha: Benefit and Cost Analysis (Ha) **Plantation Cost**

S.N.	Particulars	Quantity	Labour No. (Men)	Rate (Rs.)	Total Amount
1	Land Preparation	-	35	60	2100
2	Root Sucker	350 kg	-	2	700
3	Compost Manure	10 ton	-	300	3000
4	Sucker Plantation	-	30	60	1800
5	Tillage+ Manuring	-	50	60	3000
6	Irrigation	-	-	-	2000
7	Treatment				200
8	Harvesting	-	25	60	1500
9	Processing	-	-	-	3800
	Total				**18100**

Production Cost (Second Cutting)

S.N.	Particulars	Quantity	Labour No. (Men)	Rate (Rs.)	Total Amount
1.	Compost manure	5 tons	-	300	1500
2.	Tillage	-	20	60	1200
3.	Harvesting	-	10	60	600
4.	Processing	-			2000

Income:
Essential Oil manufacture (First and Second Cutting)= 100 kg
Rate =Rs.500
Income =Rs. 50,000
Expenditure =Rs. 23,400
Net benefit = Rs. 26,600

Annex 12.16.Frenchbasil: Benefit and Cost Analysis (Ha) **Plantation Cost**

S.N.	Particulars	Quantity	Labour No. (Men)	Rate (Rs.)	Total Amount
1	Land Preparation	-	27(Men + Tractor)	100	2700
2	Nursery Management				640
3	Compost Manure	5 tons	-	300	1500
4	Transplanting		30	60	1800
5	Manuring		10	60	600
6	Irrigation	-	25	60	1500
7	Harvesting	-	70	60	4200
8	Processing	15 batch*	-	200	3000
	Total Cost				**15940**

* 500 Kg Grass= 1 batch

Income:	
Essential Oil manufacture	= 25 kg
Rate	=Rs.120
Total Income	= Rs. 30,000
Net Profit	= Rs. 14,060

Annex 12.17.Indreni: Benefit and Cost Analysis (Ha) **Plantation Cost**

S.N.	Particulars	Quantity	Labour No. (Men)	Rate (Rs.)	Total Amount
1	Land Preparation	-	40	60	2400
2	Nursery Management				1200
3	Seed	2 Kg		200	400
4	Compost Manure	5 ton	-	300	1500
5	Transplanting		25	60	1500
6	Manure + Tillage		20	60	1200
7	Wood Support	1600		10	16000
8	Irrigation				3000
	Harvesting	-	40	60	2400
	Total				**29,600**

Production: 575 kg Seed	
Rate	=Rs.100
Total Income	=Rs. 57,500
Expenditure	=Rs. 29,400
Net benefit	= Rs. 27,900

Annex 13

Cultivation techniques for some important NTFP species in the Terai

1. ***Cinnamomum tamala*** (Local name: Dalchini)

Dalchini (*Cinnamomum tamala*) is found between Sub-tropical to Temperate Zone of the country between 500 – 1828 m altitudes. These are moderately sized trees, 2- 12 m tall with staked leaves, opposite or sub- opposite, elliptic – oblong, 3-nerved from the base, leathery, entire and long-pointed; flowers are yellow. Fruits are ovoid, fleshy and blackish (when ripe) drupe up to 13 mm long and 1 cm across supported by somewhat enlarged perianth tube bearing the truncated perianth lobes. The fruits ripen from June to October. There are about 2500 seeds per kg.

Regeneration and cultivation techniques:

It is generally propagated through seeds but vegetative propagation techniques have also been practiced in some places.

1. **From seed:** Fruits should be collected in the months of June to October from healthy and well-developed trees having good morphological characteristics. The collected fruits are kept in shade to rot for 3-4 days and thereafter the flesh is removed. Seeds are washed in water and dried for a week in a shade. The seeds retain good viability for six months. The seeds are sown in seedbeds in March- April after soaking it in cold water for a night. Seed beds are prepared from top layer fertile forest soils having decomposed leaf litter mixed with sand and some farmyard manure (compost) in the ratio of 2:1:1. The beds are generally made 1 m wide and are raised 15 cm above ground surface for drainage purpose. The length of beds vary, it may be made up to 12 m long based on size of land available. Seeds should be sown at depth of about 2.5cm into the beds by making drills, at spacing of 5-8cm. There should be one seed per drill. The drills are then covered by soil, followed by mulching with leaf litter or paddy straw. Up to 90 % germination can be observed with freshly collected seeds. Seeds normally germinate in 30 – 60 days after sowing. Seedlings thus raised are then transferred to polypots after they get four leaves. The seeds can also be directly sown into polypots at 2.5cm depth.

2. **From cuttings**: The cuttings are taken from wood of the previous season's growth, or the one before it. They are taken during January – February (the dormant season) before the leaf buds begin to swell and should be taken from well-ripened branches in the lower part of the crown of healthy vigorous trees, growing in full sunlight. Cuttings should be 15-25 cm long and 0.8 – 2.5 cm in diameter with atleast 3 and preferably 4 nodes. The cuttings should be prepared on the same day as the shoots are collected, and set at once into beds or 7inx4in polypots. The soil in the pots or beds must be free draining loamy sand with atleast 50% sand content. The cuttings are inserted somewhat inclined into the pots or beds so that atleast two buds remain below the soil surface. In beds they should be 15-20 cm apart. Beds/polypots should be well watered and shaded until roots have formed on the cuttings. New shoots begin to develop after one and half month and roots after two months. When cuttings in beds have taken root, they can be transplanted into large polypots for transplanting to the field.

3. **From coppices**: When established trees are cut one foot above the ground level, the stumps produce coppices. These coppices can be managed annually by singling.

Natural regeneration: The ripe seeds are dispersed by gravity, birds and monkeys from the trees and in appropriate conditions of soil, moisture and light, they germinate.

Plantation: One-year-old seedlings are planted during monsoon in the fields at 2.5 to 4 m apart. The trees have to grow for 6-8 years, before they come into bearing seeds and may continue to give annual crops for 50 to 100 years. After an orchard is established it is not necessary to make any further plantation; the ripe seeds fall from the trees in the soil and germinate. The self-sown seedlings when about a foot high are transplanted.

Uses: Leaf is bitter, sweetish; hot, and alexiteric; useful in scabies, disease of the anus and rectum, piles, heat trouble and bad taste; liver and spleen treatment; useful in inflammation, sore eyes; stop salvation; stimulant and carminative, find application in rheumatism, colic, diarrhea and scorpion sting.

Source: Reference Nos. 2, 3, 5, 6, 7, 8, 9, 11 and 13 of the Annex 12.

2. *Phyllanthus emblica* (Local name: Amla)

Amla (*Phyllanthus emblica)* is distributed throughout Nepal (up to 1400-m altitude), India, Malaysia, Srilanka and China. These are deciduous trees nearly 12 m tall; leaves 1 cm by 2mm, small narrowly linear, resembling pinnate leaves; flowers yellow in axially fascicles on lower leaves; flowers are yellow. Fruits are nearly spherical, globose, fleshy and greenish yellows with 1.3-1.6 cm diameter. The fruits ripen in Nepal between August and February, and most commonly between September and January. Each fleshy fruit contains a hard nut with trigonous seeds in 2 seeded 3 crustaceous cocci. The seeds can be extracted by exposing the stones to the sun until they crack and allow the seeds to escape. The number of seeds ranges from 34,000 to 89,000 per kg. There are conflicting reports about the viability of the seed; Troup (1921) says that it does not retain its viability long, but Campbell (1983 a) states that it can be stored for atleast 12 months.

Regeneration and cultivation techniques:

Amla is commonly propagated from seed on farmlands. The trees coppice well and pollard moderately well, with coppice shoots, in particular, growing vigorously.

1. **From seed:** Amla is generally propagated through seeds but seed propagated trees bear inferior quality fruits and have a long gestation period. Seed is soaked for 4-6 hr. in water before sowing. Seed is sown in beds, in lines 10-15 cm apart, with 2-3 seeds at 15-cm intervals along the lines. After sowing, the seed is covered lightly with soil followed by mulch of grass or leaves, which is removed about one week after germination begins; if the germinating seedlings show the sign of collar rot the mulch should be removed immediately. The seed is generally sown in March or April, in which case the beds will need to be watered until the onset of monsoon. Shading is necessary to protect seedling against hail and frost. When the seedlings attain four leaves (after four months of sowing) these are pricked out into polypots in September/ October. Germination of soaked seed is fairly rapid, between one to four weeks, and up to 50 % germination can be expected. As far as possible, the polypot filling material (potting mixture) should consist of soil (forest

soil with decayed leaf litter), sand and farmyard manure in 3:1:1 ratio. Temperatures below 20° C and above 35° C reduce germination. Campbell recommends nine months in nursery, implying September – October sowing, but Indian authorities state that the seed sown in March will produce seedlings plantable in subsequent rainy season.

2. **From cuttings:** Amla can also be propagated from hardwood cuttings, but it has been found that cutting from branches of large trees tend to retain their branch character, and do not grow straight upwards. Stem cuttings from lignified young plants are satisfactory. Cuttings 15 cm long, and about 8mm thick, root readily in winter. They can be raised by planting them in standard polypots or in a bed or in propagator, with the base of the cutting about half way down the pot so as to allow space for the roots development. Use of such cuttings is important for raising genetically superior plants. The cuttings should be inserted in either a standard nursery soil mix (two-part soil to one part sand) or in sterilized sand and thoroughly watered in. Over watering must be avoided but cutting should never be allowed to dry out.

3. **By budding:** Shield budding is done on one-year-old seedlings with buds collected from superior strains. Bud is grafted on the stock in the form of a patch after removing the bark of the stock in that portion or by making an incision in the bark of the stock in the form of 'T' and then fixing the scion inside it. The scion is tied on the stock first with *sutli* (Jute rope) and then with polythene strip keeping the bud uncovered. The best months for budding are April and May.

Natural regeneration:

The fruits, under natural condition, fall towards the end of cold season and early part of the hot season. They lie on the ground until the fleshy cover of fruitd dries up and the hard fruit stones split open, which they do with some force, the seeds thus may escape. Deer, which eat the fruits, disgorge the hard stones during rumination, which then dehisce, on ground especially during summer showers. Germination takes place early in the rainy season.

Plantation:

Pits of 30cmx30cmx30cm are dug during May/June at distance of 4.5 m by 4.5 m and should be left to sunlight exposure for 10 – 15 days. Each pot is filled with mixture of ash (of dry leaf litter), surface soil and about two-kg of compost. Then seedling is planted into it. Seedling of 30cm height is considered good for planting.

Uses:

The fruits are very rich source of vitamin C (ascorbic acid). An alkaloid phyllembin and several tannins are also reported. 'An Amla fruit a day keeps the doctor at bay' is a rural Indian take on the western refrain 'an apple a day keeps the doctor away' (Balachander, 2003). The fruit is useful in burning sensations, vomiting, biliousness, urinary discharges, thirst, leprosy, constipation, inflammations, erysipelas, piles, anemia, strangury; used in cough poisoning, leaves are used in opthalmia and incipient blindness; the seed is acrid sweet; useful in biliousness, asthma, bronchitis leucorrhoea, vomiting (Ayurveda).

Source: Reference No. 1, 2, 3, 5, 6, 7, 9, 10,12, 13 and 15 of the Appendix.

3. ***Sapindus mukorossi*** (Local name: Ritha)

Ritha (*Sapindus mukorossi*) are found in temperate region of Nepal between 900 to 1200 m altitude and in India. These trees are up to 10 m tall; leaves stalked, pinnately compound; leaflets 10 – 16, short-stalked, lanceolate, alternate or sub-opposite, oblique base, entire, smooth; flowers are small white or purple ciliated. Fruits are fleshy, globose, saponaceous, 2 cm in diameter; seed solitary, 10 – 13 mm in diameter, black and loosely contained in the fleshy pericarp. The fruits ripen in between September and February. It bears grape like yellowish, glossy and to some extent transparent fruits. The fruit is a drupe consisting of an outer coating also known as pericarp, which is thick and glutinous forming the saponaceous substance. The fruit comprises of 50 to 55 % pericarp and 45 to 50 % seeds. The constituent sugars are glucose, arabinose, xylose, rhamnose, and traces of mannose and gluctose. Yield of saponin depending on the quantity of fruit varies from 6.1 to 8.4 %. The kernels of the seeds yield about 24 and 35 % of fatty oil by expression and solvent extraction methods respectively. The numbers of seeds vary from 600 to 900 per kg. It can be stored for a year.

Regeneration and cultivation techniques:

1. **From Seed:** It is better to collect seeds in December from trees older than 5/6 years. Fruits should be collected when the pericarp gets wrinkled and the color turns to yellowish brown. When the mature fruits are dried in direct sunlight for a week the pericarp and the seed get partially separated to each other; the hard and black seeds can be extracted by breaking the pericarp. Seeds are sown in March /April and the seedlings produced are planted to fields in July/ October. Before the seed is sown it should be put into hot water, and left in it for seven days; if this is not done, germination may be greatly delayed. Also seed sown in autumn will not germinate until the following spring. Treated seeds usually germinate within 4- 6 weeks (untreated seeds take 2 to 4 months to germinate, and germination is very irregular) with germination of 45-80%. Seeds sown (in March/April) directly into polypots with one or two seeds per container are found to provide convenient planting material by the rains. Very frequent root pruning is essential; once a strong taproot has been allowed to develop outside the plastic pot, pruning the root is likely to kill the plant.

2. **From Cuttings:** cuttings from healthy branches on lower part of crown of good phenotypic tree of the size of thumb (length 15 cm and diameter 8 mm) are made with atleast three nodes. The lower part of cuttings are treated with saturated solution of 'rootex hormone C' and kept in sandy soil in beds somewhat inclined; one node is kept inside soil and one at soil surface. The cuttings produce roots between 30 to 45 days; these are then planted to fields in rainy season. The beds should always be kept moist.

Plantation:

Old seedlings can be planted in monsoon by root shoot cutting in which a portion of tap root longer than 20 cm are cut off and stem is also cut so that 5 cm stump remains above soil surface after plantation. Up to five-month-old seedlings can directly be planted in fields. Bare root plants can also be used but in general survival is only 30 to 50 %.

Uses:

Pulp of the fruit is used as a substitute of soap. It is also used medicinally as an expectorant and in the treatment of epilepsy, and as a fish poison.

Sources: Reference Nos. 2, 3, 6, 7, 9, 10, 12 and 13 of the Appendix.

4. *Aspargus recemosus* wild. (Local name: Kurilo)

Kurilo Plants are found throughout the tropical and temperate region of the country from Terai up to 1800 m above sea level in Nepal. These are a straggling, much branched and spinous herb or shrub; cladodes 0.6 –1.2 cm long, linear; flowers are small, white and fragrant in racemes. Fruits are berry about 8 mm in diameter, globose, pulpy, 3-lobed purplish black when ripe; seeds with hard black and brittle testa. The tuberous succulent roots are 5- 15 cm long and about 2cm in diameter, fascicled at the stem base, smooth, tapering at both ends. Cultivation of the species can be done in site having loose, sandy and deep soil, tilted properly

Regeneration and cultivation techniques:

Plants are mainly propagated in two ways:

1. **From seeds:** Fruits ripe in December/ January. Ripe fruits are eaten by birds very frequently and so it should be timely collected. Ripe fruits are collected when the fruits fall on the ground due to shaking of plants. The collected fruits are kept in shade for two/three days so that the pulps get loose due to rotting, and thereafter, they are washed in water by rubbing with hands. Thus the pulp and seeds are separated. Seeds are sown in nursery beds in April/May maintaining space of 15 cm between seeds and then the beds are mulched with paddy straw or leaf-litters. It is better to soak seeds for about 2-3 hours before sowing in order to increase germination percentage. Seeds germinate within a month and the germination is around 70 %. Seedlings thus raised (of about 20 cm height) are planted in fields in July/ August.

2. **From tubers**: though plants cannot be produced in sufficient number by this method, tubers are dig out in February/ March before sprouting and tubers with one shoot are planted in nursery beds. Numbers of shoots emerging from tubers in a plant vary depending on the age of plants. Plants thus developed are kept in nursery beds till July and thereafter these are planted in fields. Treatment of tubers with dung water suspension for 24 hours before planting has shown good results.

Plantation:

Seedlings should be planted preferably on ridges (in a line) 1.5 – 2 m apart maintaining 45 – 60 cm space between seedlings. Application of farmyard manure at the rate of 12 metric ton per hectare increases the yield of roots considerably. New tender shoots develop 4 -5 months after plantation and at that time chemical fertilizers @ 2.5 kg Nitrogen, 2.5 kg Phosphorus and 5 kg Potassium per ropani (= 0.05 ha) can be added to the site. Plantation should be made in monsoon and whole site should be cultivated and properly drained.

Uses:

Roots are bitter, sweet, used in cooling indigestion; appetizer; alternative, stomachic, tonic, aphrodisiac, galactagogue, astringent to the bowels, useful in dysentery, tumors, inflammations, disease of the blood and eye, throat complaints, tuberculosis, leprosy, epilepsy and night blindness (Ayurveda). Roots are also useful in disease of the kidney and liver, scalding urine, gleet and gonorrhea (Yunani).

Source: Reference Nos. 2, 3, 5, 7, 9, 12 , 13 and 14 of the Appendix.

5. ***Zanthoxylum armatum D. C.*** (Local name: Timur)

Timur is commonly found in the temperate region on Nepal between 950 – 1700 m altitudes. These are small trees, nearly 3 m tall; stems and branches armed with prickles; leaves with stipular spines at the base, alternate, odd-pinnate; leaflets 3 – 9 in number, sessile, lanceolate, gland dotted; flowers are small whitish. Fruits are 5 mm in diameter, globose, and red when ripe; seed solitary, 2.5 mm in diameter, and shining black. Fruit ripens in between September to November.

Regeneration and cultivation techniques:

Timur can be cultivated in steep, sloppy and stony sites where no grain crops can thrive. Its regeneration can be obtained in two ways.

1. **From seed:** Ripen red fruits are collected in October- November by hand picking and seeds can immediately be sown after cleaning. The collected seed sown in March –April has relatively shown good performance. The seed may be stored up to six months in sealed containers, provided it is thoroughly dried first; after six months the germination percent drops rapidly. Nepalese practitioners have achieved only maximum 20% germination so far. When seeds are sown in winter in seedbeds then the beds should be covered with mulch and plastic. Seeds should be soaked in warm water for a night before sowing and seedbeds should be kept moist. Seedlings when attain height of about one foot they should be planted in fields in monsoon.

2. **From branch cuttings:** Thumb size (15 cm long and 1 cm diameter) branch cuttings with at least 3 nodes from healthy trees are planted in beds some what inclined. Cuttings should be hardwood or semi-hardwood portion of branches. Plants produced in this way give good fruit yields. The part of cuttings to be kept inside soil if treated with rooting hormones (rootex 'C' for hard/semi-hard wood) would show good result. Cuttings kept in March- April will get established as a plant by producing roots by the monsoon of the same year. Layering of branches can also produce new plants.

Plantation:

When the seedlings are planted for fencing purpose the spacing is generally kept less of about 60 cm. When the plantation is for commercial purpose the spacing of 2 m by 2 m is good. Timur start producing fruits after 3 years of plantation and it gives fruit every year thereafter. A mature tree can yield up to 12 kg of fruits.

Uses:

Fruit is sweetish, bitter hot, tasty and digestible, appetizer and anthelmintic; removes cough and abdominal troubles; useful in eye, ear and lip diseases; also useful in headache, heaviness, leucoderma, troubles of the spleen, difficult micturition; seeds are sharp with a good taste and smell useful in diarrhea, carminative, good in brain disease and insanity; useful in stomatitis, strengthen the liver, purify the blood; remove foul smell from the mouth; seeds and the barks are used as an aromatic tonic in fever dyspepsia and cholera; employed to catch fish; flowers in combination with other drug are prescribed for snake bite.

Source: Reference Nos. 2, 3, 7, 8, 10 , 12 and 13 of the Annex 12.

6. ***Rauvolfia serpentina*** (Local name: Sarpagandha)

Sarpagandha is found in Nepal between 100 – 1200 m altitudes above sea level and the plant grows only sporadically. These are small erect shrub, 0.9 m high, bark pale, rarely lenticellate; leaves in whorls of three, thin, 7.5 - 18 by 2.5 - 6.3 cm sized, lancoelate, acute; flowers white, often tinged with violet color; calyx glabrous, bright red; corolla 1 – 1.3 cm long or rarely little longer. Fruits are drupe – single or didymous – purplish black when ripe. Fruits ripen from October to December. Plants start flowering (in July/ September) just after six months of plantation but fruits from one-year-old plants are considered good. The plants can easily be propagated through seeds sown in nursery as well as by vegetative means i. e. stem as well as root cuttings, but the yield of roots of the plant raised through seeds is far more than the yield obtainable from plants raised vegetatively.

Regeneration and cultivation techniques:

1. **From seed:** since all fruits do not ripe at the same time, fruits should be collected regularly twice in a week. The seeds should be extracted by rubbing ripe fruits in a cloth bag and removing the pulp through washing with water. The seeds are white and hard. It should be stored in a sealed pack after drying properly in sunlight. Germination capacity of seed diminishes gradually after six months. The seeds are sown in nursery beds of convenient size during March/ April. Before sowing, the seeds may be soaked in water for about 24 hours. They are sown in drills at 1 cm depth. The distance between the drills may be kept at 2.5 cm. The beds are kept moist during dry summer months. Germination starts after 3 weeks and may last for 8 weeks. Good viable seeds give about 30% germination. About 20 kg of seed is required for raising one hectare of plantation. While preparing beds for seed sowing compost should be added @ 1 kg per sq. m.

2. **From roots:** Cuttings of root about 2.5- 5cm in length are made in June/July and these are kept horizontally inside soil at about 5 cm depth. The cuttings begin to sprout after three weeks and about 52 to 79% of them have found to survive and produce roots.

3. **From stems:** The stems 15 – 25 cm long when planted in nursery beds with the base of the cuttings 7.5 cm below the soil surface will produce plants with roots. The beds should be kept moist till the cuttings sprout and produce roots.

Plantation:

Transplanting is done by the end of June or beginning of July depending on the monsoon. Seedlings should be of 7 to 10 cm in height at the time of plantation. They are planted in holes made with a stick. Spacing between the seedlings is kept at 30 cm by 30 cm. Two or three weeding may be necessary in the first year.

Harvesting:

Plants are dug out for roots after 2-3 years growth. At the time of digging soil must be moist to facilitate digging and separation of roots from the adhering soil. Two-year-old plantation can give about 1120 kg of dried roots per hectare. After digging, the roots are thoroughly dried in the sun otherwise they get mouldy and become useless.

Uses:

The root is bitter, acrid, heating, sharp, pungent; anthelmentic, cures ulcers and poisonous effects of scorpion sting and snake bite, cure madness (Ayurveda); decoction of the root is employed in labors to increase uterine contraction; juice of the leaves is instilled into the eyes by the natives of India and Java as a remedy for the removal of opacities of the cornea; root is used by the Mundas as a snake remedy.

Source: Reference Nos. 3, 5, 7, 9, 10,12 and 13 of the Appendix.

7. ***Acacia concinna*, wild *DC*** (Local name: Sikakai)

It is prickly climber occurring in the riverine *Acacia catechu* - *Dalbergia sissoo* or *Shorea robusta* forests in moist place up to 400 m above sea level. It is a moderate sized (5 -15 m long) deciduous climber with brown bark having white spots; leaves bi-pinnate (5- 10 cm) long; compound leaf; and twigs armed with short hooked spines in pairs. The yellow flowers are in spherical clusters and the pods are thick, succulent, straight, 7.5– 10 cm by 2.2 cm depressed between the seeds. The pods contain 6 – 10 seeds and when dry appear brown and wrinkled.

Regeneration and cultivation techniques:

From seed: Healthy seeds are collected in April from well-ripped and dry pods; collection should take place as soon as they begin to open on the trees and release the seed. Seeds are extracted from the pods by drying them and beating with sticks. The seeds should be dried thoroughly and stored in well-sealed polythene bags. Treated in this way the seeds should remain viable for a number of years. As seed is produced in abundance every year, long periods of storage should rarely be necessary.

Seeds are soaked in water for a night before sowing. Seeds can be sown on a well-prepared seedbed or tray or directly into 3 inch by 7-inch polypots (@ 2 seeds per pot) or at the base of a support tree/pole/haze etc. Seeds are sown at such a depth that the seed coat is just covered in soil and the seed beds should be mulched with grass or similar substance. Seeds should be sown in March April to produce plantable seedlings 20 – 30 cm tall by mid July. In case of polypot sowing if, shortly after germination is complete, there are two seedlings in a pot one

of these should be removed and either pricked out into empty pots or thrown away. Four five week after sowing the pots should be spaced so that there is a 5 – 10 cm gap between the rows of pots and at the same time roots should be pruned. This root pruning must be continued every 10 – 14 days, as acacias develop very vigorous taproots. In terai 12 –14 weeks in nursery is needed.

Natural regeneration:

The pods ripen, turning from green to reddish- green, from the beginning of March to end of April. They dehisce soon after ripening, and began to fall in April though some may remain on the climber until July. The seeds remain attached to the pod valves, which may be blown considerable distances by winds; seed is also disseminated by water. Regeneration is most profuse on moist alluvial soil under shade.

Plantation:

Planting should not be later than July. For most purposes, suitable plantation spacing should be 2mx2m. Regular weeding is necessary for at least two years after planting. Weeding before monsoon, in monsoon and in winter is recommended for good performance. Pits of 30cmx30cmx30cm should be dug and it should be fed with decayed leaf litter, animal dung and compost before plantation.

Uses:

Pods may be shaken down or collected off the ground. If the area is not protected from fire the pods get burnt. The pods are powdered and used as detergents and for personal cleanliness. Sometimes perfumed powder is marketed. Sikakai powder is preferred to soap when taking an oil bath. It does not leave the skin dry. But it has irritant nature to the eyes. It would probably be more largely used as it is believed that it promotes the growth of hair and removes dandruff. The powder is also used for washing linen, silk and gold ornaments. The powder contains about 5 % saponin and the seed contain about1.4 % oil.

Source: Reference Nos. 3, 7, 10 and 13 of the Appendix.

8. ***Piper longum linn.*** (Local name: Pipla)

It is found in hot and moist climate in terai. It is also occasionally found in the foothills of Himalayas. It is a creeping, rambling, climbing or trailing aromatic herb. Its lower leaves are long stalked, alternate, ovate cordate, 7 nerved, basal lobes equal; upper leaves sessile or sub-sessile, oblong; male spike yellow, 1- 1.5 cm long; fruit very small, ovoid, completely sunk in solid fleshy spike which is 2.5 –3.8 cm long, erect, blunt, blackish green and shining. Its flowering season is September to October and fruiting season December to February.

Regeneration and cultivation techniques:

1. From stem cuttings: The plant is generally propagated through stem cuttings having roots at nodes. Cuttings having three nodes are planted in well-prepared beds raised 15 cm above ground surface having 1-m width and length depending on requirement. One node of the stem cutting is inserted inside soil; one is kept in touch with the soil surface and the other above

the surface. The nursery beds for cuttings are prepared from fertile forest soil, sieved sand and farm yard manure in the ratio of 3:1:1. The cuttings are kept at 10 cm spacing in beds in monsoon. The beds should be kept moist all the times until he cuttings are well established.

2. From suckers: The plants can similarly be propagated through suckers. It also requires rich soil. The suckers are planted soon after the monsoon set in; the suckers can also be planted first into nursery beds and then into fields.

Plantation:

The plants thus raised are planted in fields at the spacing of about 1.5mx1.5m. After the plant grows up to about 60cm, they should be provided with support so that they do not need to creep over ground surface. Plants that creep over surface produce large vegetative biomass but do not give fruit.

Harvesting:

Green fruits are collected by hand picking in winter and the fruits are dried in sunlight till they turn brown. 200 –300 kg of fruit can be produced after two year of plantation, and in third year still more production can be obtained. The fruit production diminishes after third year and vegetative biomass increase.

Stem and thick root of Pipla is called as Piplamul. Cultivation of Pipla for Piplamul can be done for 30 years and production can be obtained after one and half year. Digging the thick roots and cutting the nodes of stem on the surface makes the harvesting of Piplamul. Usually 500 kg of Piplamul can be obtained from a hectare of plantation.

Uses:

The root is pungent, heating, stomachic, laxative, useful in bronchitis, disease of the spleen; the unripe fruit is sweetish, cooling, useful in biliousness; the ripe fruit is useful in cough, asthama, abdominal complaints, fevers, lucoderma, urinary discharge, tumors, piles, disease of the spleen pains, also used in the treatment of leprosy insomnia, jaundice, tuberculosis (Ayurveda); the root and fruit are used in palsy, gout, lumbago; fruit is tonic to the liver, stomachic, useful in snake bite, scorpion-sting, night blindness (Yunani).

Sources: Reference Nos. 5, 7, 12 and 13 of the Appendix.

9. *Eulaliopsis binata* (Local name: Babio)

Babio is a perennial tufted grass, which is found in the bare slopes and forest blanks. It (English name Sabai grass) is also known as Bankas or Sabe Ghans in Nepali. The grasses may be up to 3 feet long and are found along the foothills of Mahabharat and Siwalik range up to 1200 m. The grasses have needle like blade (leaf 2-3 mm wide) with sharp edge and the tips are leaned towards ground touching the surface while the middle portion is elevated. The grass emerges very well from the older roots/remains (stools) in monsoon. The grass flowers in October/ November. Extraction of the grass commences in November and extends up to March/April every year.

Regeneration and cultivation techniques:

1. **From seed:** seed of the grass should be collected in November/December and should be sown in April/May by broadcasting in field tilted once or twice and weeded cleanly. The site should be well draining with higher sand content.
2. **From slips:** Slips with roots can be isolated from the old clumps and can be planted at desired place.

Uses:

Its chief use is to entwine/plait rough rope for rural house (huts) and fence construction. Tharu ethnic communities are mainly found to involve in the enterprise. The enterprise has now taken the form of commercial business and has been supporting rural livelihood to some extent. The grass is also used in large in pulp and paper production. It is mainly used for the manufacture of writing and printing papers.

Sources: Reference Nos. 3, 4 and 13 of the Appendix.

10. *Calamus spp.* (Local name: Bet)

Bet (in English, Canes, also commercially known as rattan) are the stems of climbing spiny palms of the genus *Calamus* principally and of a few other related genera like *Daemnorops, Ceratolobus, Plectocimia* and *Korthalsia,* which yields rattan of less importance.

Many species of rattan are believed to be native to Nepal. Some of them are still unidentified. 30 species of rattan are found in Indian subcontinent up to 3000-m altitude. Eight species of rattan viz. *Calamus tenuis* (Pani bet), *C. acanthospanthus* (Gauri bet), *C. laptospadix* (Dangre bet), *C. latifolius* (Phakre bet), *C. errectus* (Tokari bet), *C. himalyansis* (Himali bet), *C. enermis*, *C. Khasiyanus*, have been so far identified in Nepal among which Pani bet (*Calamus tenuis*) is most dominant. Pani bet is found extensively in Banke, Bardia, Kailali, Surkhet and Kanchanpur Districts of Nepal.

Rattan is distributed from Terai to Midhills. Semi-evergreen and tropical deciduous forest is most suitable habitat for rattan. Major distribution areas of rattan are eastern, central and western zones of Nepal.

The stems in the climbing species are long (often up to 100 m), usually cylindrical and of uniform thickness, solid, tough, elastic. The outer surface is hard, smooth and shining (due to deposition of silica). The core however, is spongy. The modified hooked leaflets are 5-10 cm long, woody, viciously sharp, bent acutely backwards, enabling the plant to climb long distances over tropical vegetation by hook like spines in the petioles of the pinnate leaves. The rattans are said to approach maturity in about 5 years.

Regeneration and cultivation techniques:

1. **From seed:** rattans flower from March to May and the seeds ripen in July/August. The fruits are collected after it ripens and the pulps are removed carefully by rubbing between palms or in cotton bag. After removing the pulp the seeds are washed, dried and stored properly. The seeds are sown a week after collection in nursery beds. The seeds should be

soaked in cold water for about 24 - 48 hours before sowing. Seeds sown within a week after collection have shown good germination percentage. Seeds are sown in drills along lines at 5 cm by 5cm spacing and should be covered by an inch thick layer of soil followed by mulching with leaflitters or paddy straw. The bed should be irrigated twice daily (in morning and evening) in order to keep it moist all the time. Seeds begin to germinate after two weeks. The seedlings thus produced should be transplanted to polypots after two months and they should be provided shade too.

2. **From rhizome:** plants can also be produced by planting rhizome cuttings/ pieces of 1-1.5 inch long with atleast one node in nursery beds or directly in fields in monsoon.

Plantation:

One-year-old seedlings should be planted in moist alluvial nutrient rich soil at spacing of 1-1.5 m. The plantation site should not be waterlogging areas. The plantation site should also include trees at 3-6 m spacing in order to support the climbing palm.

Harvesting:

Harvesting, mature culms are cut 25-30 cm above ground and hand pulled from their loafty purches on the crowns of supporting trees. The soft terminal portions are discarded. The sheaths are removed with a clapper or by dragging them against the trunks of trees with rough bark. Soon after cutting, the canes are dried in the sun or over a fire.

Canes are considered ripe for harvesting when the leaf sheath starts loosing and the lower part of thje stem is exposed. After discarding the top tender portion, the remaining portion is cut into pieces 4.8 m long, bent, dried and treated in various ways.

Uses:

They are extensively used in industry- thick canes for making furniture frames, walking sticks, polo-sticks and umbrella handles, and thinner ones for making baskets, large quantities of which are used in tea gardens, in collieries and in the railways. Canes are also split and the strips from the outside with the smooth outer surface are largely used for making seats and backs of chairs and sofas, while the lusterless strips from inside of the canes serve for making various articles such as furniture, baskets, sieves, mats, etc. They are used as substitute for ropes and cables in suspension bridges.

Sources: References Nos. 2, 3 and 13 of the Appendix. In addition, articles by C.L. Chaudhary and S.M. Amatya..

11. Bambusa/*Dendrocalmus* Sp. (Local name: Bans)

Bans (Bamboos) are tall, perennial, arborescent grasses with woody culms from rhizomes, belong to *Bambusae* tribe under *Graminae* family. There are 60 genera and 600-700 species found in the humid tropical and extra-tropical regions. Until now very little is known about the identification and distribution of different species of bamboo in Nepal. About 136 species are found in Indian subcontinent. The most important genera are *Arundinaria, Bambusa, Cephalostachyum, Dendrocalamus, Gigantochloa, Melocanna* and *Ochlandra.* Bamboos form rich belts of vegetation in the well-drained parts of the monsoon region. They may be

deciduous or evergreen, the former being characteristics of dry and latter of damp or shady localities.

Mature bamboo clumps produce new shoots every year throughout the rainy season. These shoots develop rapidly, and within two or three months rich their full height and diameter. The culms persist in the clumps if not cut for about 7-12 years, depending on the species, dying slowly and being replaced by new culms.

Bamboos vary greatly in their flowering habits. Some species flower only at long regular intervals of up to 120 years or more. However, most bamboo flower at shorter, more irregular intervals and sporadic flowering very frequently occur within a single clump or few clumps. Such sporadic flowering have been seen in all the seven principal Nepalese *Bambusa* and *Dendrocalamus* species. When many genetically different clumps flower close together cross pollination is fully effective and the clumps will often die after producing great amounts of seed, especially at times of low rainfall and in areas prone to drought.

Regeneration and cultivation techniques:

1. **Traditional vegetative propagation**: the traditional method used on *Bambusa* and *Dendrocalamus* species involves preparation and planting of a bulky offset cutting, which comprises the whole or a subsequent part of a one year old rhizome section with a 1-3 m length of culm attached and which can weigh up to 40 kg. This method is very reliable if undertaken properly. A culm from the previous year should be removed along with its entire rhizome and cut back to 1.5 - 2.5 m; the rhizome should always have 2-3 nodes with an eye or branch. If bamboo can be watered plantation can be done in March/ April, otherwise in late May or early June during rainy weather.

   The rhizome plus culm should be planted as soon as possible after they have been cut from the parent clump, preferably the same day. The size of the planting pit will depend on the size of the rhizome, ranging from 40 cm by 25 cm for large bamboo to 15 cm by 10 cm for the smaller. In dry weather the bamboo should be well watered after planting. If long culms are used they may need to be tied to stakes to protect them being shaken by animals or wind.

   The first culm to arise from a good offset cutting can reach 4 m in the first year, whereas a good seedling will reach about 1.5 m maximum, so establishment from offset cuttings is usually atleast two-year quicker. With offset cuttings the advantages of quick establishment, robustness and independence of nursery facilities are set against the drawback of bulk, low availability, difficult extraction, transport and planting, and the possibility of imminent flowering.

2. **From culm cuttings**: There are many species which rarely produce seed and can not be planted in quantity by the traditional technique but which are very important and desirable species for local planting programs. Several species of *Dendrocalamus* and *Bambusa* have now been propagated by the use of small culm cuttings in nursery beds. In this technique branches are forced to grow in a manner which encourages the basal region to resemble a rhizome and produce roots.

   Cuttings, which consist of a single node, with its branches cut back to 10-20 cm and half the internodes on each side, are used in the technique. This allows the branches to be

oriented correctly and provides maximum reserves and maximum areas are for water intake at the cut culm ends for each node. When this technique is undertaken carefully each pole used can produce fifteen to thirty plants without having disturbed the rhizome system of the mother culm at all.

The best time for planting the cutting is just before spring growth commences, when the buds are ready to burst. The culms should be cut between the nodes, leaves removed, and small branches cut off as close as possible to the culm. The central, largest, branch from each node should be cut off above the first extended internode. Cuttings should be dipped in water, or sprinkled immediately after they have been prepared, and kept moist during transport by pouring on water and covering with leaves or grasses. They should be planted without delay on reaching the nursery.

In *Bambusa* species two or three year old culms have given the best results. Culms with strong branching have been more successful than those with small branching; and cuttings from the top of the culm less than 4 cm in diameter have usually failed.

The cuttings are placed in very well watered, shaded beds with large central branch horizontal at the soil surface, and the bud at the first node of the central branch facing upwards. The earth should be molded up over the culm, especially at the ends, to reduce desiccation from sum and wind.

If cuttings obtain enough water from the beds and do not dry out, shoots will develop in one or two weeks. Most of those shoots will grow to about a meter in height and produce leafy branches before beginning to root after about three months. Irrigation and shading must be maintained all this time.

Below 1500 m the cuttings will need to be kept 16 months in nursery; above 1500 m for a yearlong. The plants must have shoots at least 2 m long before being planted out in the field. They can be cut back a little to ease transportation and reduce desiccation.

3. **From seed:** The widespread and useful species '*Dendrocalamus hamiltonii* (Tamabans)' very frequently flowers in a sporadic manner. Flowering clumps can be found in most areas at any time; and in many cases there are a few clumps within pollination distance that produce seed. Small-scale gregarious flowerings have been seen producing vast amount of seed. Bamboos appear to be able to flower at any time of year and production of flowers in an isolated flowering clump which does not quickly use up all its reserves by seed production can be continuous for up to three years or more.

In all Nepalese species in which seed production has been seen, the course of events in individual flowers from their first development from anthesis to seed falling has taken less than one month. Prompt falling of ripe seed causes difficulties in seed collection. Most bamboo species seed is collected from ground. To simplify this the ground should be cleared of litter and vegetation, or sheets placed under the flowering branches when seed fall is first observed, and seed should be collected daily. Knocking the clumps helps to remove the seed. If the amount of seed produced is very small, cultivation and protection of the land under the clumps allows the development of natural regeneration, which can be transplanted, via plastic bags into nurseries, given sufficient care.

After collection the seed should be cleaned, treated with insecticide, sundried and stored in sealed containers. After rubbing the flowers so that the seed falls out it can be easily sorted by winnowing on a *nanglo* (bamboo tray).

Germination of seed of *D. hamiltonii* collected in January and stored in cloth bags after sun drying fell from 92 to 75 % before monsoon and to 7 % after monsoon in November. Dried seed stored in a sealed container with silica gel and dried seed stored in a refrigerator without silica gel gave 25 and 22 % germination respectively in April, after 62 weeks. Thus with proper storage the seed can still be of some use the following season, while without proper storage it is only viable for one season losing its viability in the monsoon.

Bamboo seedlings are more susceptible to water stress; they require ample regular watering and good shading to protect them from direct sunlight. They grow best in nurseries in cooler, damper areas rather than those on low exposed south-facing slopes. As *Dendrocalamus, Bambusa* and *Drepanostachyum* species are not generally frost-hardy they should be raised below the frost line. Seeds should be sown directly in polypots. Two to five seeds should be put into each pot depending upon the age and quality of the seed, and large polypots 4-inch by 7-inch lay flat should be used. Germination of fresh seed of *D. hamiltonii* is very prompt (2- 7 days), but seed stored for a year takes 6 – 8 weeks. Pretreatment for two days in water enhances germination percentage. The seed should be sown in April in nurseries below 1600 m and in May at higher altitudes. After the seed is sown a layer of mulch should be put over the soil in the polypots, and the seedlings allowed growing up through this under shade. In terai seedlings will need at least 15 months in nursery; at higher altitudes 27 or 39 months. For planting out, seedlings should be at least 150 –200 cm in total height with three or more culms.

Division of seedlings (with at least four healthy shoots) is also feasible in nursery beds. Dividing the entire cylinder of root and soil from a container raised plant with a razor blade so that each half has a strong young shoot, and replacing these in polypots with some fresh soil has been successful in a hot, dry nursery as well as a cooler one. Bamboo should be planted in field a final desirable spacing of 5 m by 5 m.

Uses:

Bamboos are familiar as poor man's timber in Nepal. Bamboos have very many uses and it is impossible to enumerate them all in a short space. In every part of the country except where it is not found (the driest and highest regions) bamboo products is an integral part of rural life and it is extremely difficult to imagine the rural economy without them. The culms can be used entire, split into sections, crushed into panels or split and then woven.

Culms of *Bambusa* and *Dendrocalamus* species are used entire for strong rafters, pillars and fence posts. After splitting they are used for roof lattices, floors, ceilings and walls. Some *Dendrocalamus* species (especially *D. hamiltonii*) are used for weaving. Woven products include baskets, mats and trays used for collection, sorting, transporting and storing agricultural products. Culm sections are now finding modern used reinforcing concrete, especially in small works such as water takers and toilet slabs.

Bamboo leaves are very nutritious and palatable animal fodder. Branches and waste culm materials are readily used as fuelwood. Young shoots of several species are commonly used

as vegetable. Paper is made from bamboos in many countries; they are the principle source of pulp in India and Bangladesh.

They are also used on many festivals or religious occasions; they support symbols of the deities and prayer flags on mountain passes and summits and around houses. They are used to make swings (Ping), especially during the Dasain festival. At wedding, four small poles may be placed as a guard around the center of activities and the bride may be carried in a bamboo sedan chair or cage. Corpses are carried to cremation on a single pole of certain species. A compressive list of uses may be summarized as below:

Sources: Reference Nos. 4, 6 and 13 of the Appendix.

12. ***Matricaria chamomilla*** (Local name: Chamomilla)

Chamomilla (Family Compositae) is an exotic species for Nepal and is commonly known as German or Hungarian chamomile. The plant possesses both medicinal and aromatic properties. The flower can be processed for essential oil production. The plant can thus be cultivated as a cash crop.

German chamomile can be cultivated in the subtropical region (Terai) and the warm temperate region (the Midhills, *e.g.* Kathmandu valley and Gorkha district). Cultivation technology was developed in Nepal in 1983 by HPPCL (Herbal Products and Processing Company Pvt. Ltd. – an autonomous organization of HMG under Ministry of Forest and Soil Conservation) at Tamagadhi Herbal Farm in Bara district.

Regeneration and cultivation techniques:

1. **From seed:** This crop may be cultivated either through nursery-raised seedlings or by direct seed sowing. The seeds are usually sown after land has been properly prepared, using appropriate quantity of compost, or organic manure. Prior to sowing the seeds, they are in water for a period of 24 hours, removed and the water is drained off so that the seeds are fairly dry. The seeds are then mixed with ash or fine soil in a ratio of 1: 15 parts (1 part of seeds with 15 parts of ash or fine soil) and sown. It is best to prepare raised beds for sowing the seeds, the spacing between the raised beds should be approximately 50 cm. The spacing between individual plants, for best results should be about 30 cm.

Alternatively, the seeds may be sown without moistening or soaking in water. For this methodology, the plot needs to be irrigated prior to sowing and the seeds are only sown when the soil is free from excessive moisture. Both these techniques for planting or sowing facilitate rapid germination. the seeds begin to germinate within 5 to 7 days of sowing; germination is complete within 12 to 15 days of sowing. Approximately 0.8 to 1 kg of good quality seeds are required to cultivate 1 ha plot. In the Terai, the seeds are sown in the month of November.

In Terai, nursery is prepared in October/November. The plot is ploughed 3-4 times, and the soil thus made fine is supplemented with required amount of compost. For the nursery, beds of 1 m by 5 m are prepared; 20 – 21nursery beds are required for transplanting seedlings in one hectare of cultivation plot. This technique can be successfully applied with a relatively smaller quantity of seeds. Seeds and soil/ash mixture (1 part seed with 15 parts ash ash/fine soil) is sown in rows 15 cm apart. The spacing of rows is very important; if it is less than 15

cm, the growth of the seedling is badly affected. Irrigation should be properly managed so that the nursery bed remains moist all the time. Approximately after a month when the seedlings have attained a height of 7.5-10cm, they are ready for transportation.

Plantation:

In the Terai the most appropriate time for transplanting seedlings is mid December- mid January. The seedlings are planted one foot apart from each other and in rows that are one foot apart.

Harvesting:

The flowers are in bloom during mid February to mid April. Only mature flowers are plucked. A delayed harvest affects the quality of the essential oil present. The flowers may be plucked 4 to 5 times at intervals of 10 – 15 days.

One hectare of land yields about 1100 to 1200 kg of fresh flowers, which is reduced to about 500 to 600 kg of flowers after drying. Flowers, which had been dried for 96 to 120 hours, have been found to yield a maximum of 0.95 % to 1.8 % of essential oil on distillation. The yield of essential oil per hectare is approximately 5.5 to 6.0 kg.

Uses:

The flowers have been reported to possess ulcer protective properties. They are used in preparation of herbal teas, beauty soaps and cosmetics. Mild infusions and teas made from chamomile flowers have been for centuries employed as a popular remedy against fever, stomach troubles, indigestion, intestinal pain, and as a mild tonic and antispasmodic.

The essential oil is also used, but sparingly, as a flavoring agent in fine liqueurs, particularly those of French type. The oil finds further application in perfume compositions, to which it imparts pleasing and warm tonalities that are difficult to trace.

Sources: References Nos. 2, 5, 7 and 13 of the Appendix.

13. *Cymbopogon flexousus* (Local name: Lemon Grass)

C. flexousus is a kind of grass belonging to *Gramineae* family. The species grows wild in many tropical and subtropical parts of Asia, Africa and America. However, the oil is extracted from cultivated lemon grass as it is more economical and also the quality from cultivated stands is reliable. Red stemmed grass yields good quality essential oil having high aldehyde content and high solubility in alcohol as compared to white stemmed grass. It's cultivation can be done up to 1500 m above sea level.

Tamagadhi Herbal Farm in Bara District (at 500 ft altitude), Brinda Ban Herbal Farm, Hetauda in Makabanpur District (at 1000 ft altitude) and Tarahara Herbal Farm in Sunsari District (at 400 ft altitude) and some farmers in Jhapa, Dang, Bardia, Banke, Bardia, and Chitwan have been cultivating this species.

Regeneration and cultivation tchniques:

1. **From sips:** Lemongrass can be propagated from slips that are separated from the clump. One mature clump may yield as many as 50 slips (stools).

2. **From vgetative parts:** Lemongrass does not ordinarily produce seed unless grown in a suitable climate without being cut for a long duration. For vegetative propagation 2 to 4 stools with their tops cut off leaving about one third of the total height of the plant, may be planted at spacing of 60cmx60cm (27,889 plants per hectare) or 75cmx75cm (17,689 plants per hectare) at the commencement of regular shower of monsoon.

3. From Seed: For propagation through seed, sowing is done in nursery beds in April and later transplanted in the field. The seeds germinate in five to seven days. Approximately about 1.5 kg of seed is required for raising sufficient seedlings for raising a hectare of plantation.

Plantation:

Transplanting is done with the break of monsoon, when the seedlings are about 45 – 60 days old. For broadcast sowing, the seed is sown directly in the field in June in some places where monsoon start early; in Eastern Terai sowing may be done in July with the commencement of regular monsoon. Systematic weeding is necessary to promote good growth and also to prevent weed from getting into distillation still. Two or three weedings are done during the crop season. Earthworks at the clumps may also help the crop.

Soil affects both the grass yield and oil content of the species considerably. The grass grows best on well-drained sandy loam soils, thriving even on light but fertile sandy soil giving relatively more oil with a higher citral content than plants from very fertile soils. It does not grow in compact and poorly drained soils. Grass grown on dry sandy soils yields oil rich in citral, whereas in humid sandy loam soils the citral content tends to be lower. The grass requires warm tropical climate with plenty of sunshine and well-distributed but not excessive rainfall. Warmth and sunshine help in the increase of oil. In regions of abundant rainfall more harvests can be made but the citral content in oil tends to be low.

Lemongrass is quite a soil exhausting plant and requires Nitrogen, Potas and Phosphorus fertilizers. After a rotation of grass, leguminous plants such as peas, gram and other green manure crops may be planted to enrich the soil again. Thereafter green manure crops are ploughed back.

Harvesting: For harvesting, the grass is usually cut 15 to 25 cm above the ground level with a sickle or a hatchet. In case of grass raised vegetatively, the young plants require (depend on soil and climatic conditions) 4 to 6 months to develop sufficiently to have first harvest. After first harvest the grass grows rapidly and subsequent harvest may be collected at intervals of 3 to 4 months. Thus 3 to 4 cuttings can be had every year. A plantation naturally lasts for 4 years and when it is raised on fertile soil with proper care it may last even up to 9 years.

Uses:

Lemon scented oil is extracted from the grass by distillation. The main constituent of the oil is citral. Other subsidiary elements are geraniol and citronellal. It is extensively used for a number of aromatic chemicals and vitamin A. the spent grass after processing is used for making cardboard, straw board, paper and as feed for livestock.

Sources: Reference Nos. 2, 5, 7 and 13 of the Appendix.

14. *Cymbopogon winterianus* (Local/English name: Citronella)

Citronella grass belongs to *Gremineae* syn. *Poaceae* family to which other aromatic grasses like lemongrass, palmarosa grass and ginger grass also belongs. Although botanically there are several varieties of citronella grass, from the economic and cultivation point of view, *C. winterianus* is important which yield the citronella oil of importance for trade due to its high citronellal and geraniol content. It contains between 80 to 90 % of total geraniol including 35 % citronellal. Its oil is used for isolation of geraniol and citronellal which can be converted into some of the most widely used aromatics viz. citronellal, hydroxy citronellal, synthetic methol and esters of geraniol and citronellal etc.

Cultivation techniques:

Citronella requires a lot moist climate and flourished on rich soils. *C. winterianus* requires a richer soil and more rainfall as compared to other species.

1. **Vegetative propagation:** Citronella is propagated vegetatively from stool (slips) obtained by separating them from the clumps. A one old clump generally gives about 20 or more stools. The stools are planted in prepared field in rainy season.

Plantation:

The optimum spacing for the species is 75cmx75 cm. However, the spacing may be reduced to 60cmx60cm in poorer soils when intensive harvesting is practiced and the plantation has to last for a shorter rotation. The grass stools are usually planted by digging holes with a stick. One or two slips, preferably two may be put into each hole. Weeding and hoeing (loosening of the soil), in early stages of plantation and after each harvesting are advisable to improve the yield of grass and oil.

The usual practice of manuring is to use the exhausted grass from the distillation stills as such and sometimes furnace ashes are applied mixed with waste grass. Adding of cattle manure in poor soil has beneficial effects; also 80-120 kg Nitrogen, 40 kg Potash and 40 kg Phosphorus fertilizers are recommended for one hectare of land per year. The fertilizer amount should be used up in 3 installations; firstly within first month of plantation, and rest three times after harvesting.

Harvesting:

Slips planted in June /July may be harvested after 9 or 10 months of growth and thereafter cuttings may be made regularly at intervals of 3 to4 months, collecting 3 to 4 harvest per annum. Economic life of the species under normal condition is about 4 years, after which it has to be replaced as both oil yield and quality get diminished considerably. The yield of the oil varies from 45 to 84 kg per hectare per year.

Uses: Oil is used chiefly in mosquito repellant creams, in scenting of soaps, spray, detergents, and polishes and in cheap perfumes.

Sources: Reference Nos. 2, 5 ,7 and 13 of the Appendix.

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